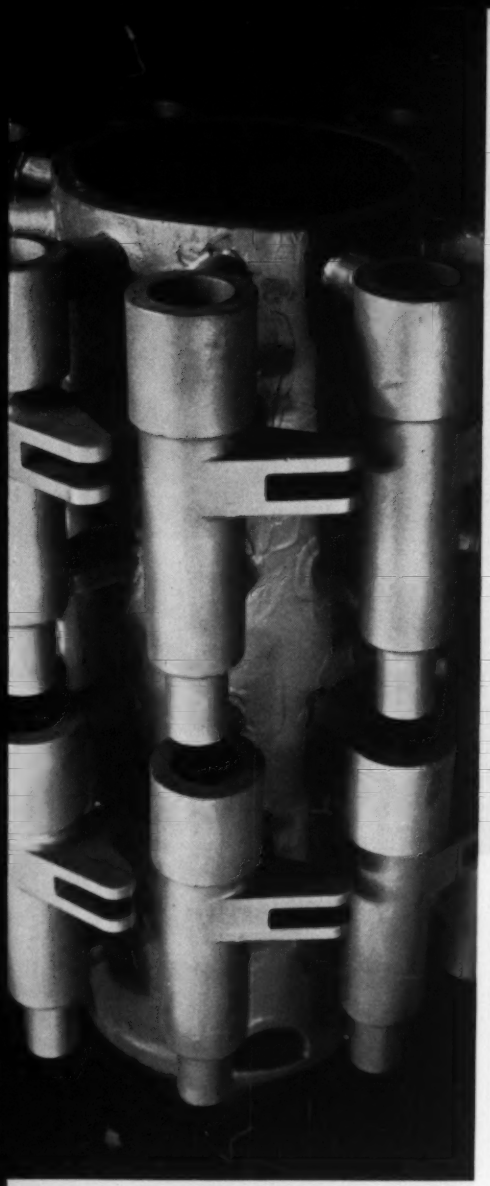

STEEL

The

Metalworking Weekly

DECEMBER 26, 1960

A PENTON PUBLICATION

Hollow Sprue Cuts Casting Costs

This setup, precision cast in stainless steel, weighs 54.4 lb. The usable castings weigh 26.3 lb. A solid sprue would have added weight and extra cost, but contributed nothing to quality. (The castings pass radiographic inspection.) It's a neat trick, and one way Precision Metalsmiths Inc. has been able to quote lower prices to customers in spite of rising material and labor costs. For more on how the company achieved this greater efficiency, see Page 58.

Plan Your New Plant for Profit

How to Dig Out of a Paper Landslide

Adhesive Backing Adds Versatility To Usage of Stainless Steel Foil

Tighter Control of Carbon Gives Rerolled Rail Axles More Appeal

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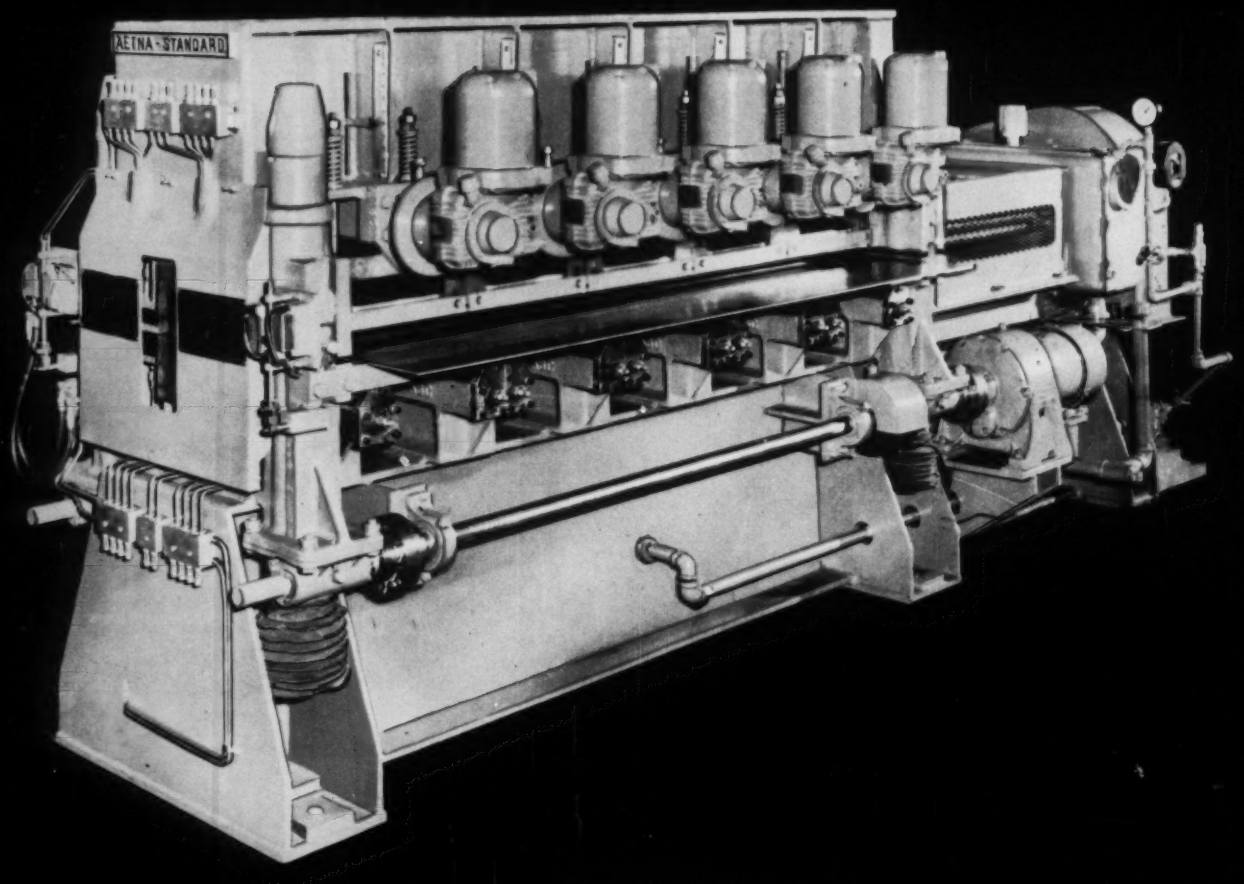
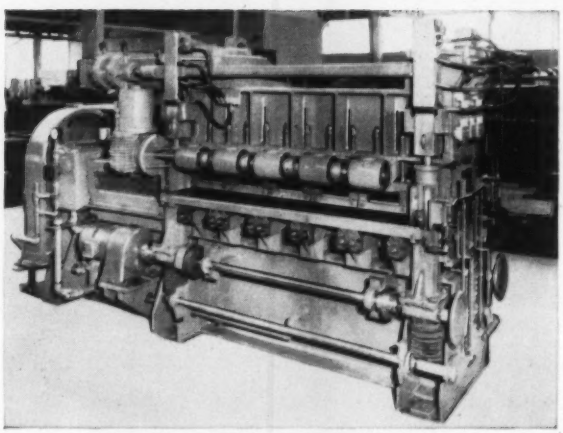


MORE WORK ON PRODUCT MADE POSSIBLE WITH THIS

NEW ROLLER LEVELER

This new Roller Leveler, designed and manufactured by the Aetna-Standard Division of Blaw-Knox, has individual motor-operated back-up roll adjustments. The operator can easily make quick correction of product shape. The additional sets of back-up rolls make possible more flexibility of adjustment and more thorough working of the product. Motorized adjustments are also included for gauge thickness which make the unit fully equipped with power adjustments.

Leveler illustrated is 1¾" dia. x 72" face—21 rolls. Other sizes can be furnished to suit individual requirements. For detailed information on this new Roller Leveler or other Sheet and Strip Equipment, write: Aetna-Standard Division, Blaw-Knox Company, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.



AETNA-STANDARD MAKES MANY TYPES OF LEVELERS

These include 2 and 4 high Roller Levelers, Rectifier Levelers, Heavy Plate Levelers, Roller Levelers for tapered sheets.

Aetna-Standard Division

BLAW-KNOX

This Week in STEEL

The Metalworking Weekly

December 26, 1960 Vol. 147 No. 26

Plan Your New Plant for Profit

Industry will spend an estimated $50 billion in the next decade for industrial expansion. Getting the most for your construction dollar requires the utmost in planning, co-ordination, and followthrough on such items as location, utilities, flexibility for future growth, and even the building contract itself. Speakers at the recent First International Building Exposition & Congress gave some tips for getting the job done effectively. You'll find them outlined in the story that starts on PAGE 30

How to Dig Out of a Paper Landslide

If you're buried in paperwork, you'll want to read how American Motors Corp. solved a similar problem. Its program freed salaried personnel for more important jobs and saved the company $7 million between 1957 and mid-1960. In that time, the number of salaried employees rose only 12.4 per cent while car production climbed 400 per cent. PAGE 36

Stainless Steel Foil Sticks Tight

You can now cover almost any clean, smooth surface with stainless steel at relatively small cost. A pressure sensitive foil (0.003 in. thick) has been developed by an Ohio firm for that purpose. Suggested applications: Architectural and decorative panels, signs, serial plates, metal furniture, appliance trim, covering for protection against corrosion. Maximum foil width is 16 in. PAGE 62

Small Forge Furnace Handles King Sized Ingots

Space in the press area was at a premium, so a new design approach was used to get this reheat furnace near the forging press at an Ohio plant. Despite its small size, it can handle king sized ingots. PAGE 68

Carbon Control Gives Old Axles New Appeal

Fabricators who buy medium carbon steel are finding products rerolled from railroad axles attractive. The products are offered in close carbon ranges (from 0.37 to 0.55 per cent carbon) that correspond to AISI C-1040, C-1045, and C-1050 grades. Rerolling mills produced about 71,000 of axle steel products in 1959. PAGE 80

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for Strength
. . . Economy
. . . Versatility

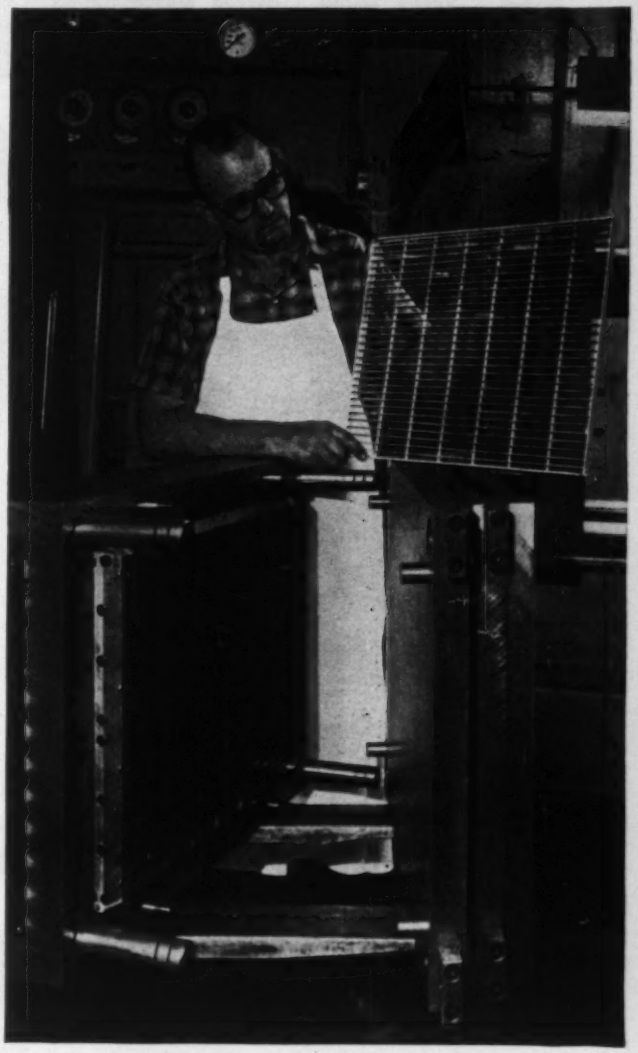
Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

Plastic grille for air conditioner molded

IN A BREEZE

with Lustre-Die



This plastic grille for an air conditioner was molded at the rate of one per minute by Midwest Plastics Corporation, Wichita, Kansas. Using a die made of Lustre-Die tool steel, they produced a perfectly formed grille, with a high sheen. The grille measures 21½ x 15 in., and is ½ in. thick.

Why Lustre-Die is ideal for plastic molders

Lustre-Die tool steel is ideal for plastic molders because it can be put right to work, without the need for heat-treatment. It's easy to machine, and it polishes beautifully . . . making possible an eye-appealing sheen on finished plastic parts.

Lustre-Die is an electric furnace steel. It has a well-balanced basic analysis. By adding a special alloy fortification, which increases its depth of hardenability, its fine mechanical properties are further improved. Because Lustre-Die is heat-treated in the mill by means of oil-quenching and tempering, it comes ready for machining and polishing. It is also carefully controlled during manufacture to insure freedom from porosity.

You can always count on a fine molding job when you use Lustre-Die. But don't take our word for it. Put Lustre-Die to work in a trial run. Your Bethlehem tool steel distributor can supply you.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Watch Out for Abrasion Caused by Scale

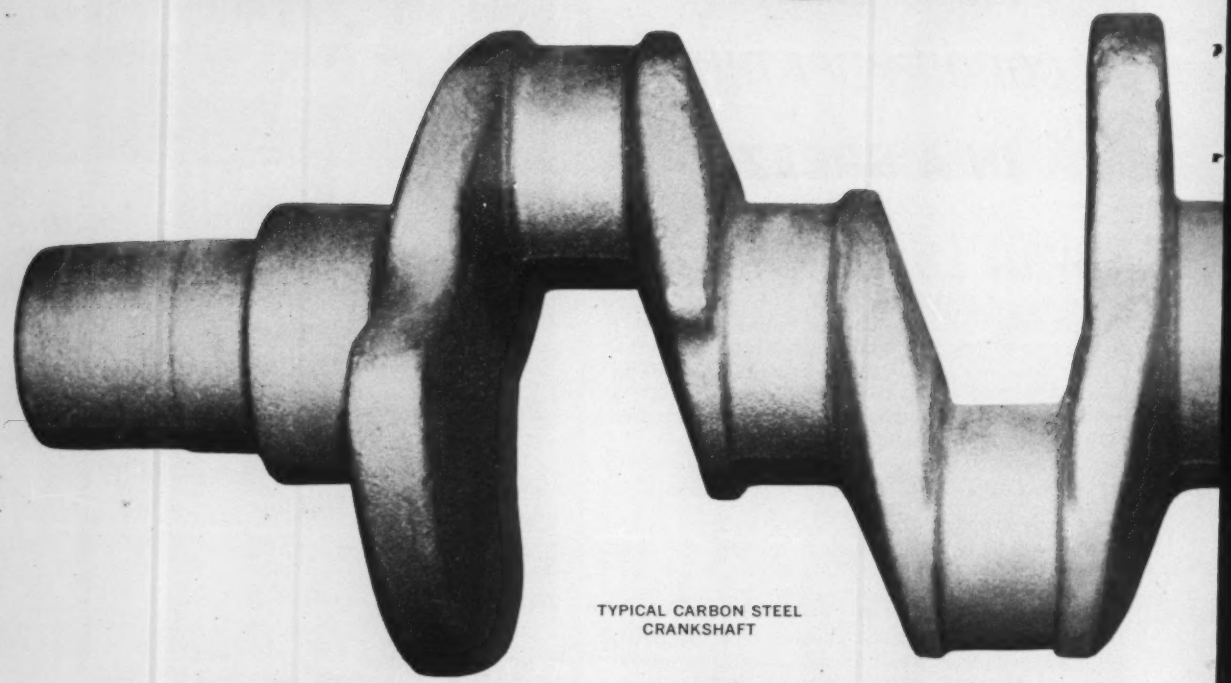
When punch-press operators are occasionally unable to obtain the required sheet stock in the usual cold-finished form, they substitute hot-rolled stock. However, this causes the service life of the punches and dies to drop to one-half or one-third of normal, or less. This result is largely due to the abrasion of the scaled hot-rolled surface on the cutting edges of the tools. Determining whether such a substitution is economical depends upon the results which are expected, and the cost, of each individual job.

One frequently hears the question: "What can be done in tooling to avoid this decrease in production?"

When punches and dies are normally made from water-hardening carbon tool steel (W-1 or W-2), or from manganese oil-hardening steel (O-1), the shortening of tool life can be avoided by changing to a high-carbon high-chromium tool steel, such as Bethlehem Lehigh H (D-2). This change usually overcomes the disadvantage of using the hot-rolled scaled stock.

However, if high-carbon high-chromium grades are already being used, there is only one method by which an appreciable improvement can be realized—the use of special heat-treatment operations. Typical treatments are short-cycle hardening, and nitriding. Complete details regarding these types of treatment may be obtained by writing Bethlehem Steel Company, Bethlehem, Pa.

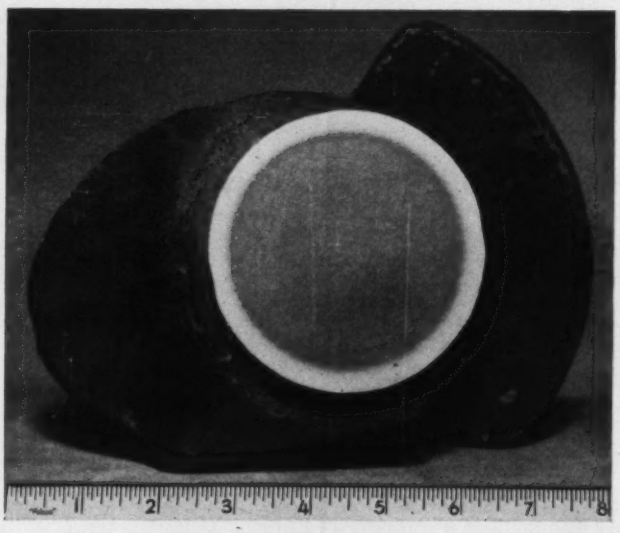
*DRASTI



TYPICAL CARBON STEEL
CRANKSHAFT

PARK'S NEW QUENCHING

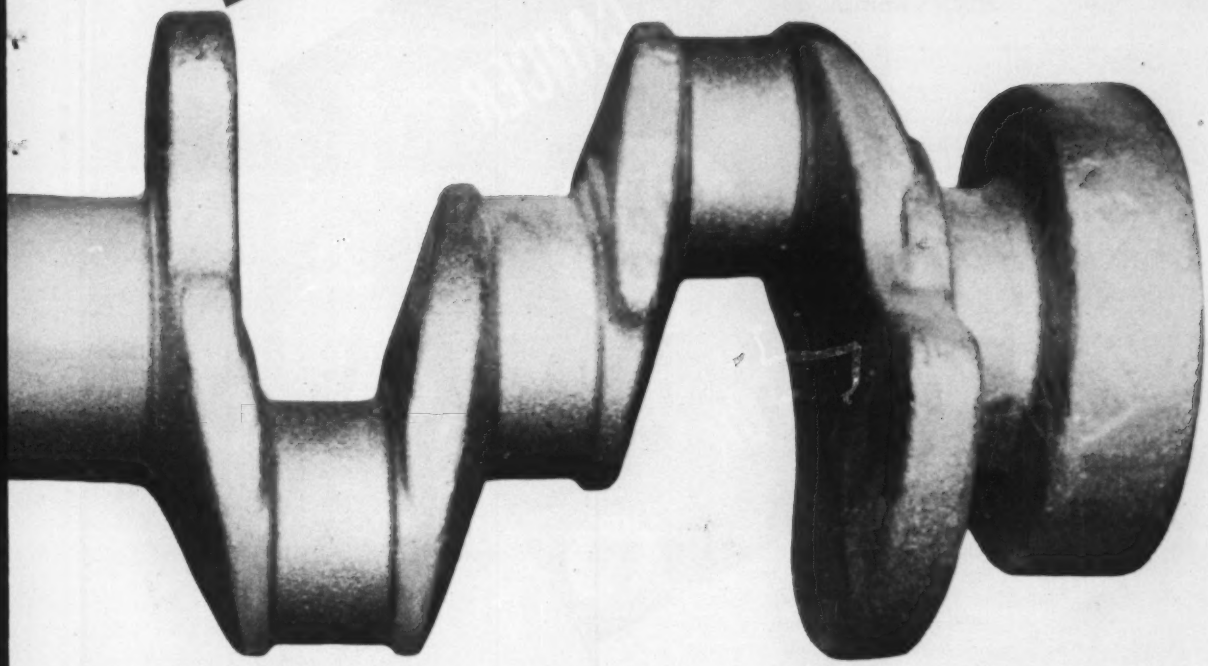
TRANSVERSE
SECTION
AS QUENCHED



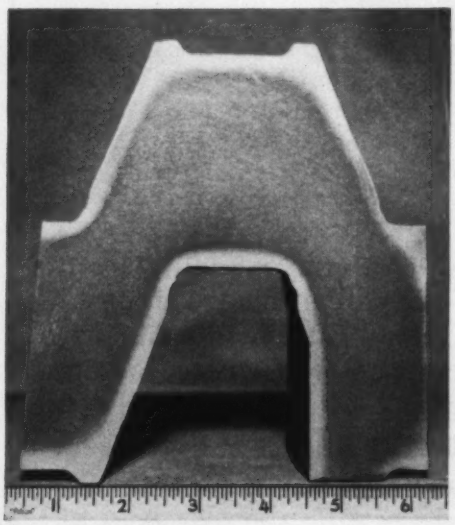
the park drop forge co.

777 East 79th St., Cleveland 3, Ohio

QUENCH



PROCESS MAY HELP YOU...



LONGITUDINAL CROSS-SECTION OF CRANKSHAFT AS QUENCHED

Uniform depth of hardness

***DRASTIQUENCH**— Applicable to many types of carbon steel forgings.

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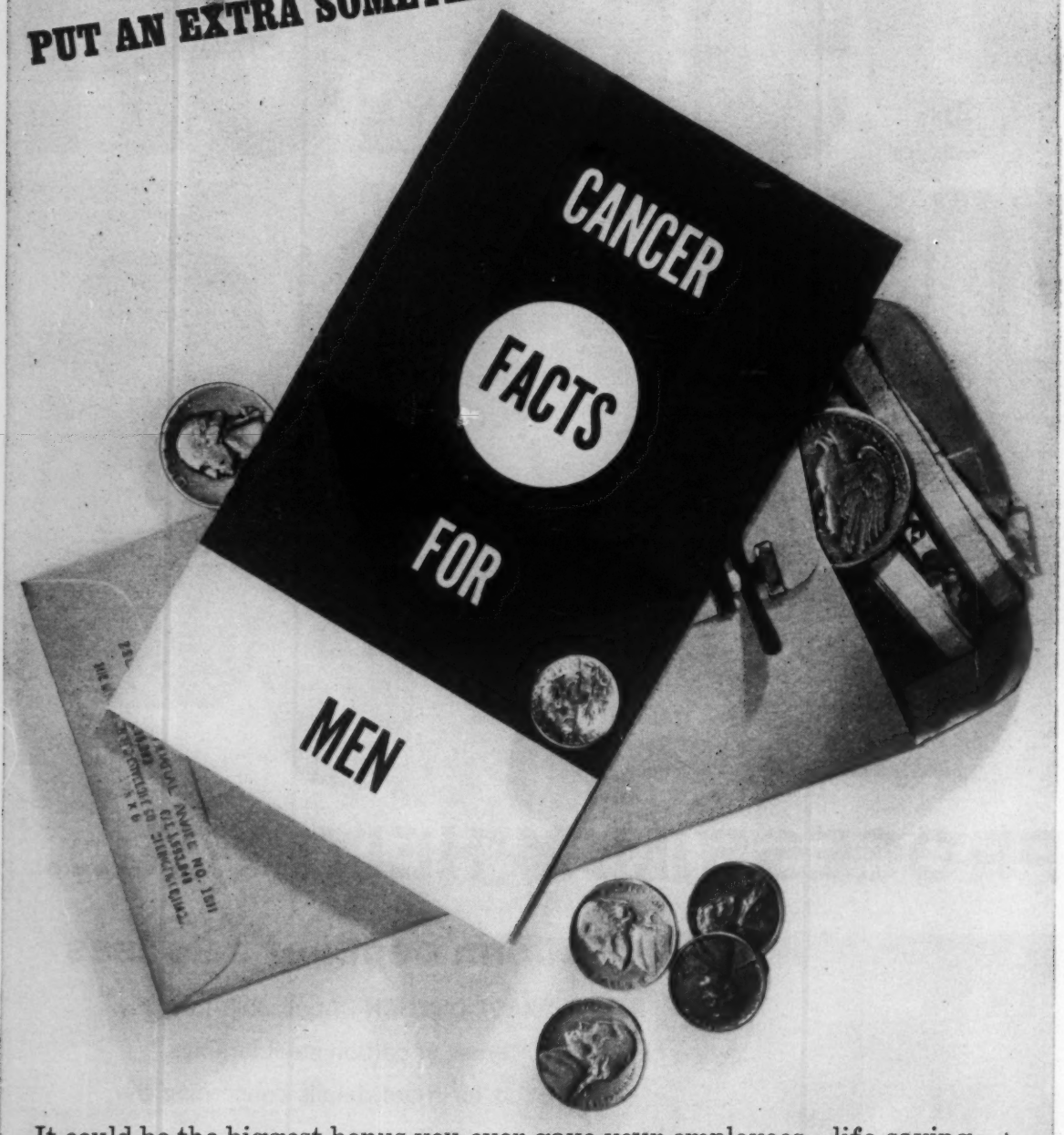
PUT AN EXTRA SOMETHING IN THEIR PAY ENVELOPES



It could be the biggest bonus you ever gave your employees—life-saving facts about cancer. Whether you have a factory or an office—a hundred or a thousand employees—we are prepared to offer a cancer education program to meet your particular requirements. Pamphlets, posters, films and speakers will bring vital information to your employees. Such programs pay off in saving lives. Call your local American Cancer Society for further information. Do it today.

American Cancer Society

"I believe that the average, over-all effectiveness of the best managed U. S. companies is under 10 per cent."

Patrick B. Haggerty
President
Texas Instruments Inc.
(STEEL, Nov. 7, 1960)

In 1961, U. S. industry will pay $58 billion in direct wages, salaries, and fringes. That is 12 times the amount industry proposes to spend on equipment, and 35 per cent of the total that metalworking's sales is expected to hit in 1961.

Is industry getting its money's worth for the $58 billion?

A team of 15 STEEL editors probed that question for next week's Yearbook issue. They traveled thousands of miles and interviewed hundreds of people to learn how you can "Revitalize Your People Power."

Scope of the Problem

They found affluence, growth in complexity of industrial organizations, and rapid technological change are among the fetters that hamper human efficiency and effectiveness. To help you remove the restraints, the editors will examine needs, aids, and solutions in this in-depth report. Here's a word map of some of the territory they covered.

Macy's Talks to Gimbel's

Associate Managing Editor John Morgan (Yale '43) journeyed to Harvard and the University of Michigan to question academicians about what's needed in labor and industrial relations. He also swung through Washington for interviews with government and labor officials.

Sore Points

News Editor Bill Dean and a number of other editors interviewed consultants and company executives. They discovered that the "people power" problem is a sore point in many companies. Customer, employee, and stockholder relations are involved, and some executives declined to talk for the record, saying: "The problem is industry-wide, but with us it is murder. I'll tell you what I think, but don't quote me!"

Sink Side Manner

In a three day jaunt, Associate Editor George Howick interviewed 5 union officials, 14 company presidents, 2 chairmen, a mayor, and heads of a chamber of commerce and a manufacturers' association. His most unusual interview, says George, occurred when the association officer, suspenders down, answered questions while shaving.

New York Resident Editor Brian Wilson stopped short as he strolled up to the offices of Adamas Carbide Corp., Kenilworth, N. J. The halt was called by the above greeting that flanked the main building's entrance. Brian allows as how it was something like seeing one's name in lights on a Broadway marquee—in a less crowded environment, of course.

His mission: Interview Adamas President Edward Dreyer for our Panel of Presidents. In that section, you'll read what top industrialists think about the problems of "people power."

Departures

This year, instead of being introduced in the Yearbook, our Program for Management will take its bow in a later issue. Other switches: The Facts & Figures section with data on production, prices, earnings, labor, and other areas of metalworking, will be published in the Mar. 27, 1961, issue. The editors decided to withhold publication until complete figures could be reported in every segment of the industry. Our annual forecast, which revealed what metalworking managers expect in 1961, was featured in our Nov. 28 issue. If you'll recall, we ran it then so you could use the survey results in your planning for 1961.

The Summons

Planning for the Yearbook started over a year ago. With research out of the way, the last

Coming

Jan. 2

IN

STEEL

Revitalize your

PEOPLE POWER

STEEL will devote a substantial part of its annual issue to an exhaustive study on how you can use human resources more effectively.

In the last decade employment costs have risen at an average rate of 6 per cent annually, compounded, while output has climbed only 4 per cent yearly, compounded. Efficiency is metalworking's greatest need. The industry will spend $58 billion next year on salaries, wages, and direct fringes. STEEL's first issue in 1961 will tell how to get more for that money.

three months have been spent in concentrated effort by the editors. The information and opinions they gathered represent the latest thinking of executives, government officials, labor representatives, scholars, and consultants. We believe you will find that the next issue will carry a most significant evaluation of human potential in industry. The challenge is yours. See it next week.

Hitting a New High

"The Nov. 21 article, 'Put a Pro in Purchasing,' brings your Materials Efficiency series to a new high in my estimation," says K. A. Cruise, chairman, National Committee on Value Analysis-Standardization, National Association of Purchasing Agents, and materials manager, Kansas City (Mo.) Div., Bendix Corp.

"This is the most interesting article I have read in a long time. I am pleased to note the increasing awareness exhibited by STEEL in the important role purchasing plays in the business world and feel certain that your readers are finding your magazine of increasing interest and value to them."

You Can Win $1000 This Month . . .

. . .in STEEL's Usership Idea of the Month Contest. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—December, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

There's more . . . you will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month award.

Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

You can enter as many times as you wish. Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Feb. 1, 1961.**

A happy and prosperous New Year from Ed Service and all the editors.

...Fluid Power news

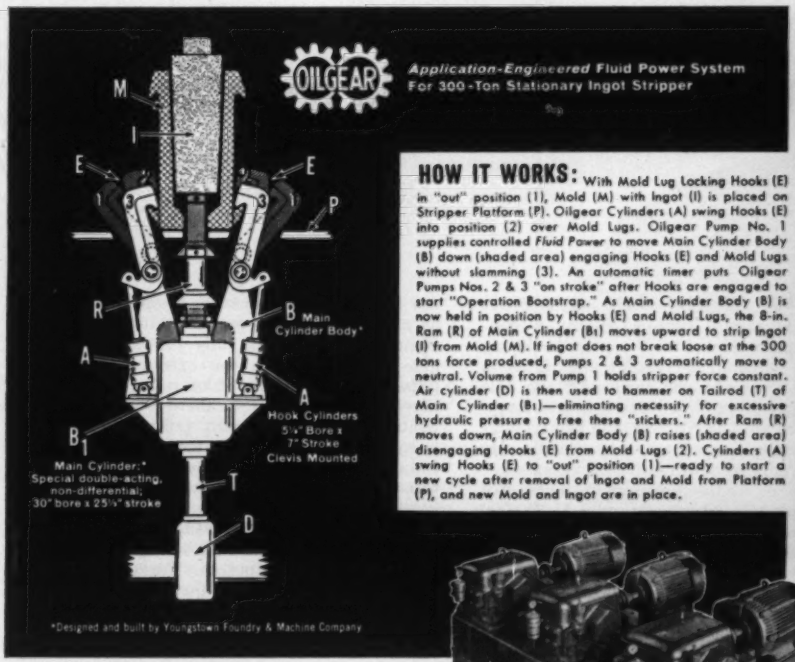
REPORT NO. 11,804 OILGEAR POWERED INGOT STRIPPER

From Oilgear *Application-Engineering* Files

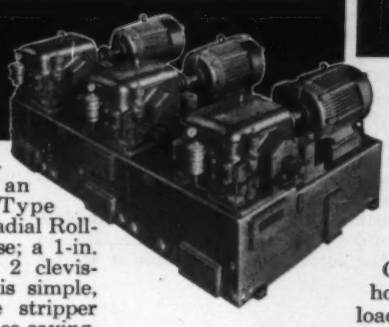
HOW OILGEAR HEAVY-DUTY SYSTEM SIMPLIFIES POWER AND CONTROL OF 300-TON STATIONARY INGOT STRIPPER—HELPS ELIMINATE MAINTENANCE DOWNTIME

DATA: To replace a mechanical-type ingot stripper because of considerable maintenance downtime caused by dirt and foreign particles jamming the motor-driven ram screw—necessitating disassembly of the entire mechanism to free the threads. A hydraulically-powered, floor-mounted stripper design was approved as most convenient for the big-end-up molds used in this particular operation—would provide faster, easier maintenance accessibility at lowest over-all initial replacement cost.

Basic Power and Control Requirements: 1. Simplicity, and trouble-free, rugged dependability. 2. To be capable of many years of heavy-duty, rapid, 'round-the-clock operation with an absolute minimum of maintenance. 3. Must be: impervious to sand, scale, heat; compact; thrifty on electrical power input, wiring, installation downtime, floor space; completely free, if possible, from maintenance-provoking belts, chains, relays. 4. One source and responsibility for power and control systems preferred.


OILGEAR
Application-Engineered Fluid Power System
For 300-Ton Stationary Ingot Stripper
M
I
E
E
P
R
B Main Cylinder Body*
A
A
Hook Cylinders 5¼" Bore x 7" Stroke Clevis Mounted
B1
Main Cylinder:* Special double-acting, non-differential; 30" bore x 25½" stroke
T
D
*Designed and built by Youngstown Foundry & Machine Company
HOW IT WORKS: With Mold Lug Locking Hooks (E) in "out" position (1), Mold (M) with Ingot (I) is placed on Stripper Platform (P). Oilgear Cylinders (A) swing Hooks (E) into position (2) over Mold Lugs. Oilgear Pump No. 1 supplies controlled *Fluid Power* to move Main Cylinder Body (B) down (shaded area) engaging Hooks (E) and Mold Lugs without slamming (3). An automatic timer puts Oilgear Pumps Nos. 2 & 3 "on stroke" after Hooks are engaged to start "Operation Bootstrap." As Main Cylinder Body (B) is now held in position by Hooks (E) and Mold Lugs, the 8-in. Ram (R) of Main Cylinder (B1) moves upward to strip Ingot (I) from Mold (M). If ingot does not break loose at the 300 tons force produced, Pumps 2 & 3 automatically move to neutral. Volume from Pump 1 holds stripper force constant. Air cylinder (D) is then used to hammer on Tailrod (T) of Main Cylinder (B1)—eliminating necessity for excessive hydraulic pressure to free these "stickers." After Ram (R) moves down, Main Cylinder Body (B) raises (shaded area) disengaging Hooks (E) from Mold Lugs (2). Cylinders (A) swing Hooks (E) to "out" position (1)—ready to start a new cycle after removal of Ingot and Mold from Platform (P), and new Mold and Ingot are in place.

ABOVE: Oilgear-equipped Ingot Stripper "in action"—Mold Lug Locking Hooks (E) indicated. A 10,000-lb. ingot has just been "stripped" from the mold. Hooks (E) will be disengaged as soon as stripper ram is retracted.



LEFT: Oilgear Heavy-Duty "Power-Pak"—consisting of 3 Oilgear Type "DX-60" Variable Displacement, Two-Way Pumps on a single reservoir base used on this installation—is remotely located, isolated from heat and gritty particles present in the stripping area.

SOLUTION: An *Oilgear Application-Engineered Heavy-Duty System* consisting of an Oilgear "*Power-Pak*" incorporating 3 Type "DX-60" Variable Displacement, 2-Way, Radial Rolling Piston Pumps on a single reservoir base; a 1-in. solenoid-pilot-operated 4-Way Valve; and 2 clevis-mounted Hook Cylinders (A, above). This simple, direct-acting, locked-circuit, push-up-type stripper with remote speed and cycle control . . . space-saving, remotely located "*Power-Paks*". . . automatic pressure and flood lubrication with continuously filtered power fluid . . . positive, automatic overload protection—has eliminated maintenance downtime problems encountered with the previous mechanical stripper. Long life for continuous, 'round-the-clock production is assured by this automatic, "*Sealed-System*"—aided by the direct application of the pneumatic jarring cylinder to free "frozen" ingots. Lower installation cost, faster—easier accessibility for preventive maintenance are but two additional advantages of this Oilgear-equipped ingot stripper. USER STATES—"*Oilgear was selected because of its simplicity, and the trouble-free, long-life performance record of other Oilgear-equipped machines in our plants.*"

With Oilgear Heavy-Duty System Components designed for thousands of hours of continuous service at full rated load, savings are compounded with every hour of uninterrupted performance. That's why machinery and equipment manufacturers and *their* customers say . . .

"for the lowest cost per year . . . it's Oilgear!"

For solutions to YOUR linear or rotary Controlled Motion problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements directly to . . .

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Phone: Mitchell 5-6715 . . . Direct Distance Dialing Code 414

Terry Potts travels 35,000 miles a year to

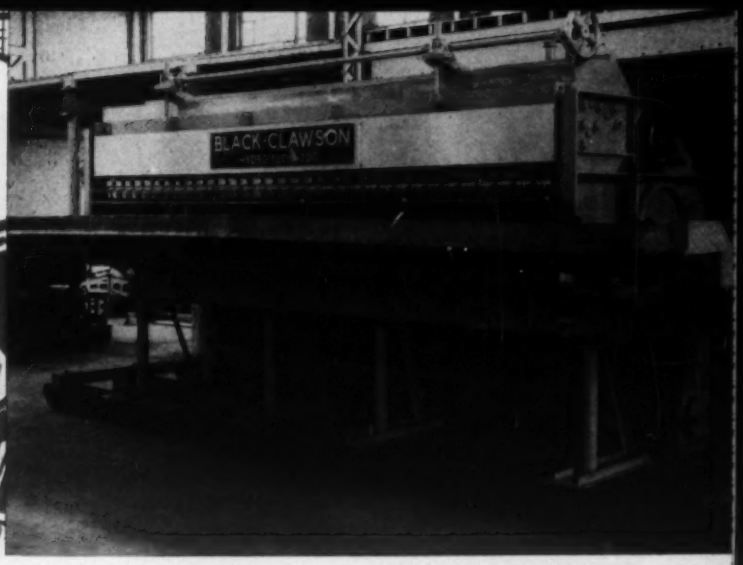
Terry Potts, Manager of Stainless Steel Sales of the Horace T. Potts Company, a leading Philadelphia steel service center, backs up his belief in personal service by logging some 35,000 miles a year by car, train or plane. His territory ranges from New York to North Carolina, and as far west as Altoona, and he's usually gone three days a week on service calls. He knows personally most of his 3,000 customers.

Behind Terry are the resources of the Horace T. Potts Company, which include a $1,250,000 Stainless Steel warehouse inventory, plus equipment for shear cutting, saw cutting, flame cutting, threading and corrugating. The Potts Company also manufactures Speedline Stainless Steel pipe fittings which are marketed by distributors coast to coast. A fleet of 17 trucks fan out over the Potts service area—some of them based in Baltimore for "relay delivery" to the Maryland region. Independent carriers are also used to assure on-time delivery.

For instance, take a fabricator of Stainless Steel like the Rodman H. Martin Co., Inc., in nearby Norristown, Pa. The people at Martin use Stainless Steel in such tough applications as a "head box" in papermaking machinery. Stainless Steel is the only practical metal to give long service in the extremely corrosive papermaking process, which relies on Stainless Steel primarily because there is no danger of contaminating the moving pulp. Martin Company depends on service, too. They know how important "on time" delivery is to their customers. That's why they depend on warehouse service for much of their material. Martin's products enjoy an excellent reputation throughout several industries. This steady performance means steady production. Terry Potts' customers know they can get fast, dependable service from him quickly and without waste.

At Horace T. Potts Co., "routine" orders usually mean 24-hour delivery. Once an order is placed, it is made up on multiple forms and sped to the warehouse and shipping departments by air tube. A running record of steel stock is kept by removing the amount and type of steel ordered from a set of stock cards. The Potts Company's Stainless Steel stock ranges

For unmatched efficiency, durability, ultimate economy, specify Stainless Steel.



service 3,000 Stainless Steel customers

from items as small as a #6 flat washer, 0.375 inches in diameter, to discs measuring over 10 feet in diameter. There are Stainless plates, sheets, fasteners, bars, bar-size angles, pipe, tubing, fittings, flanges and valves. And Potts can supply following-day delivery, cut to size or shaped for fabrication right in their own plant.

Their customers also know they can get dependable performance from the Stainless Steel he sells. Strength, corrosion resistance, heat resistance and ease of fabrication make Stainless Steel the ideal metal for countless industrial applications. From corrosive chemicals to milk handling, from papermaking to food processing, Stainless Steel makes products better.

It pays to use the right material from the start. Stainless Steel has a reputation for costing less because of its combination of strength, corrosion resistance and high temperature properties. No other metal can make such a material difference in so many applications. United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS is a registered trademark

USS United States Steel

Customer reports confirm...

CF&I Wire Packaging increases production, eases handling

In instance after instance, all across the country, manufacturers have reported cutting hours off daily downtime, easing storage and handling problems... *increasing production as much as 50%*... after they started using CF&I Steel Wire — Packaged for Your Production.

This is possible because all CF&I Wire is packaged specifically to give you one, or a number of special production or handling benefits. Several typical statements describing users' production benefits are reported here.

CF&I, the pioneer in wire packaging, makes wire in a wide range of gages and finishes. Whatever your needs, CF&I can fill them. Call your local CF&I sales office for full details on the Wire Packaged for Your Production.

CF&I-WICKWIRE WIRE

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In the East: WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

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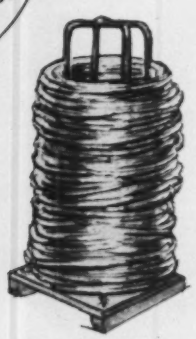


DISPOSABLE STEM-PAKS®
Capacity—500-1000 lbs.

Customer Report—
"50% increase in production since we started using Stem-Paks."

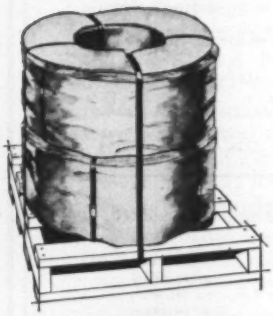
DISPOSABLE SPOOLS
Capacity—5-70 lbs.

Customer Report—
"Easy to handle and store... quick to put in operation."

FIBRE DRUMS
Capacity—250-600 lbs.

Customer Report—
"Wire protected from dust, rust and corrosive fumes. Easier handling, storage, inventory."

RETURNABLE SPIDERS: Capacity — 2000-3000 lbs. Customer Report — "25% increase in production, 20% less downtime and 80% less scrap loss with the long, uninterrupted pay-off of these returnable spiders." CF&I produces top quality wire in thousands of different types, sizes, shapes and finishes to meet all types of wire applications.

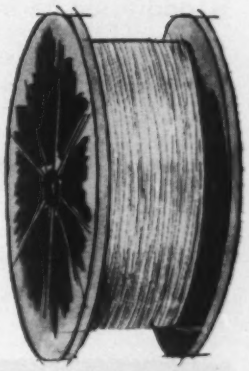


REEL-LESS CORES
Capacity—800-1000 lbs.

Customer Report—
"Easier handling, less storage problems and lower freight handling charges."

SHAPED COILS
Capacity—1500-2500 lbs.

Customer Report—
"20% increased production with longer runs, plus easier storage and reduced handling costs."



RETURNABLE STEEL REELS
Capacity—500-800 lbs.

Customer Report—
"Holds six times the wire as standard coils. Smoother pay-off, less scrap loss, easier shipping."

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Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking.

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The Metalworking Weekly

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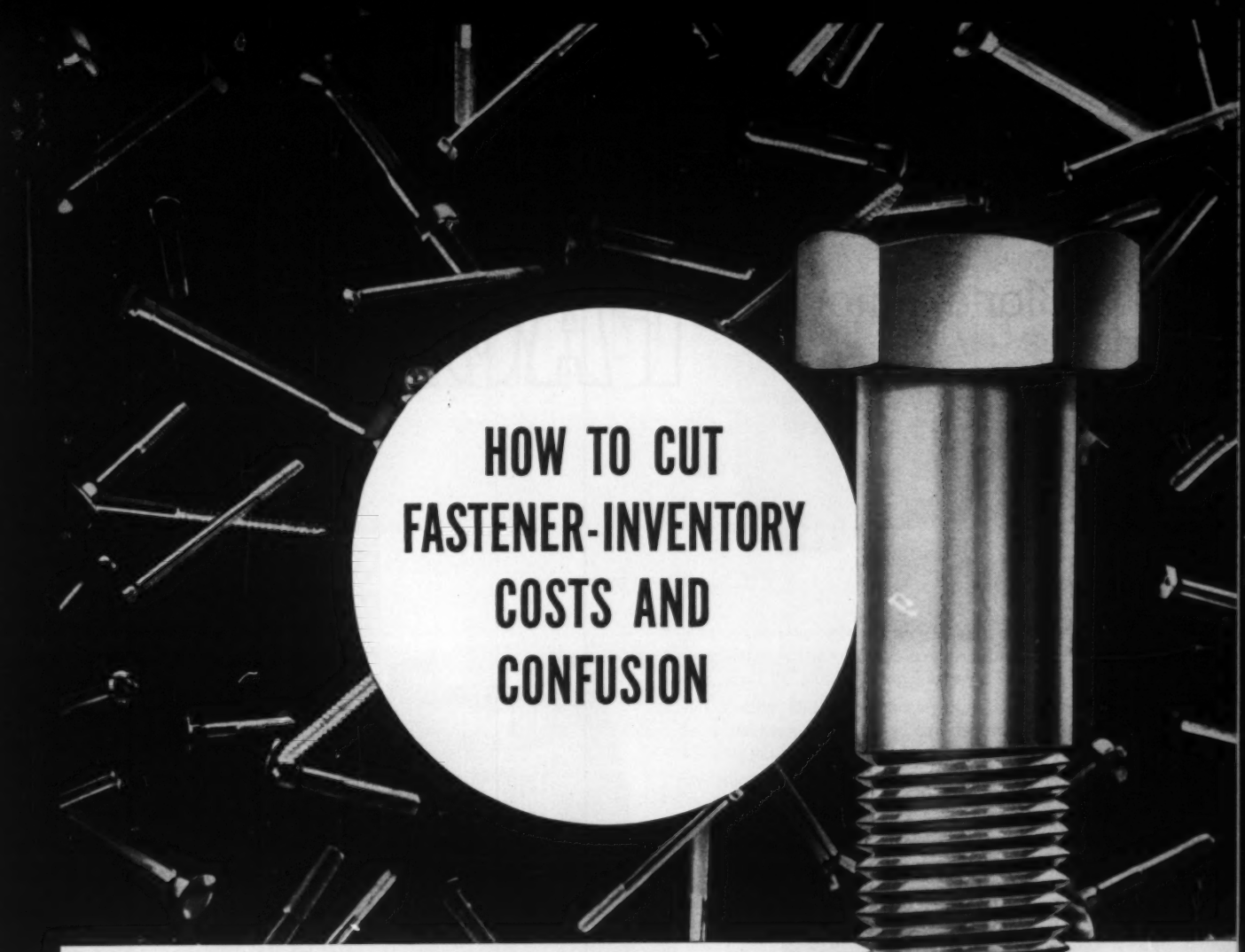


HOW TO CUT FASTENER-INVENTORY COSTS AND CONFUSION

Your Republic Bolt and Nut Distributor Can Help You

A quick check of your stocks will tell. If your inventory's out of balance—loaded with seldom-used sizes or too-many-of-a-kind bulges—you need to cut fastener-inventory costs and confusion.

The man to call is your Republic Bolt and Nut Distributor. He's helped many other manufacturers with the same problem. The secret of his success—complete stocks of fasteners of all types and sizes; quick deliveries on requirements in any quantity; dependable, full-range services.

Because your local distributor maintains fastener stocks to serve hundreds of customers, his inventory cost per unit is rock bottom. This means that he can probably supply many of your present needs at lower costs than would be possible from your own on-hand stocks.

Get acquainted with your Republic Bolt and Nut Distributor. He is as close as your phone and ready to serve you now.

Steel

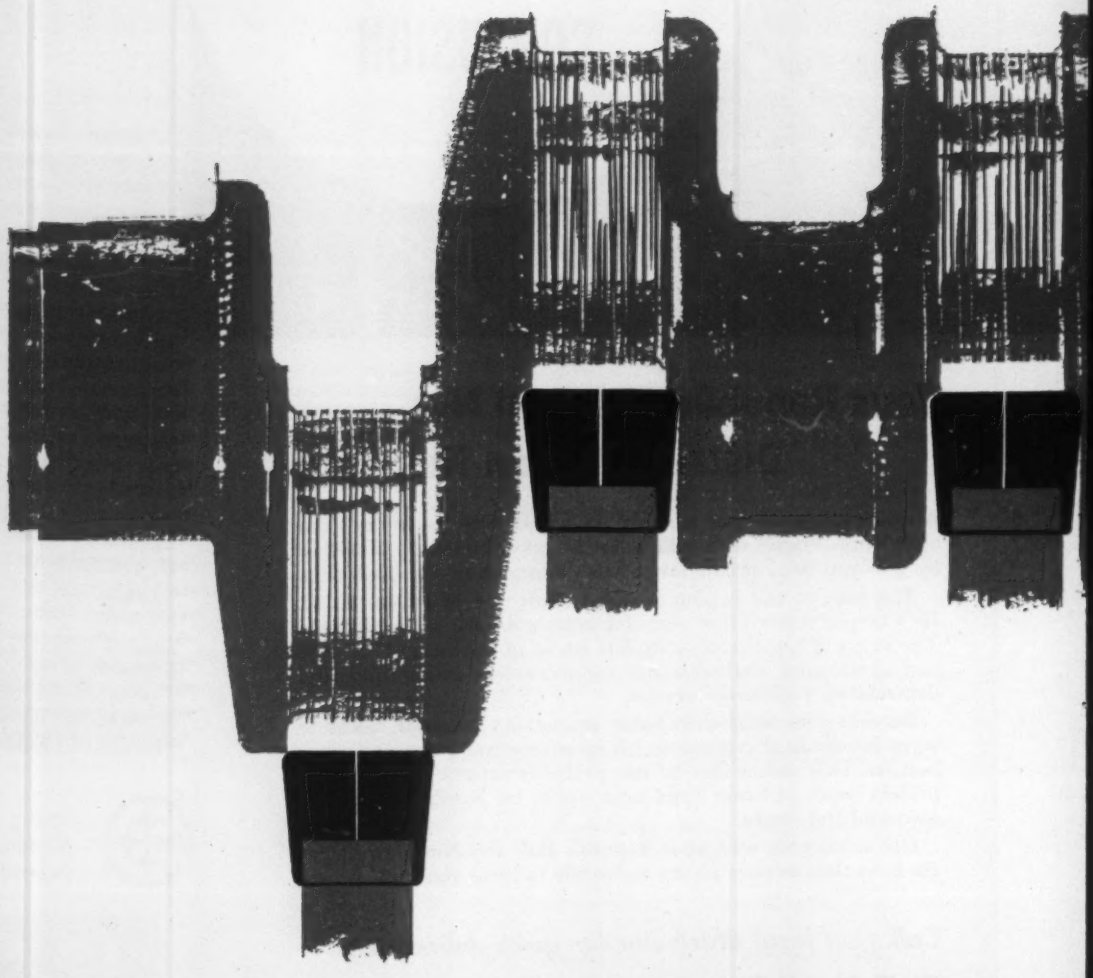
Strong,
Modern,
Dependable

Call your local distributor for quick deliveries of...

REPUBLIC Bolts and Nuts

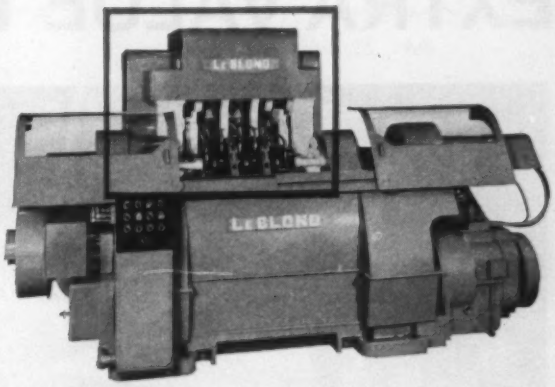
REPUBLIC STEEL

LeBlond announces **PACKAGE**



The R.K. LeBlond Machine Tool Company, Cincinnati 8,

TOOLING

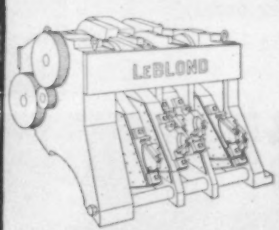


A new concept in crankshaft turning

Automatic machining plus quick and easy tooling change-over—this is the unusual combination of advantages of our new 6PC Pin Turning Lathe.

All tooling, slides and master crankshafts are contained in a package unit which can be removed and a new tooling package installed in a few hours.

By this "package tooling" concept we eliminate the time delay heretofore required to send crankshaft machines back to the manufacturer for rebuilding. In addition, capital outlay is substantially less when you purchase a new tooling package and install it in your plant.

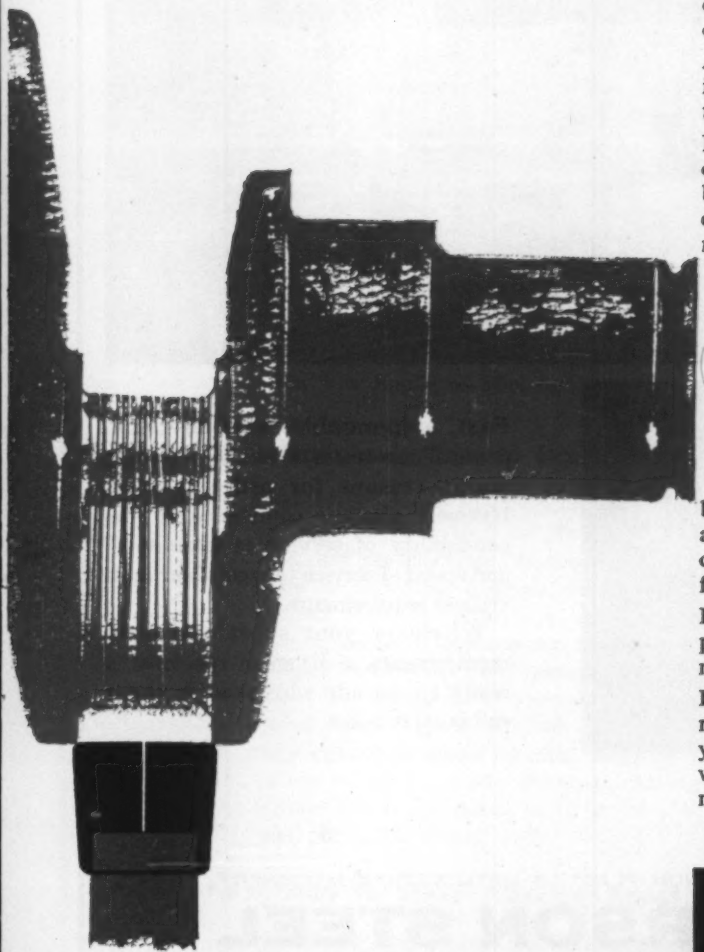


These packages are interchangeable so that any combination can be used to suit your needs. For example, you could have one base and three different tooling units. Additional packages or bases can be ordered at any time.

The LeBlond 6PC turns pin bearings, faces adjacent counterweight lobes, or both in a single machining cycle. It will handle forged or cast crankshafts with 2, 3, 4, 6, or 8 pins. It will accept cranks from 12″ to 41″ long with bearing diameters up to 5″.

Production rates will range from 10 to 40 per hour depending upon material, number of pins and webs to be machined, length of web cut, etc.

If flexibility is more important than maximum production rate in your shop, we would like to discuss the 6PC with you. Our latest catalog describes this new machine as well as our high production crankshaft lathes. Ask your nearby representative or write.



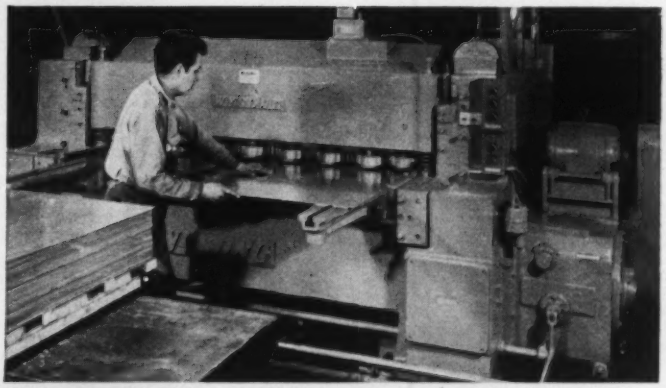
Ohio *World's largest builder of crankshaft lathes*

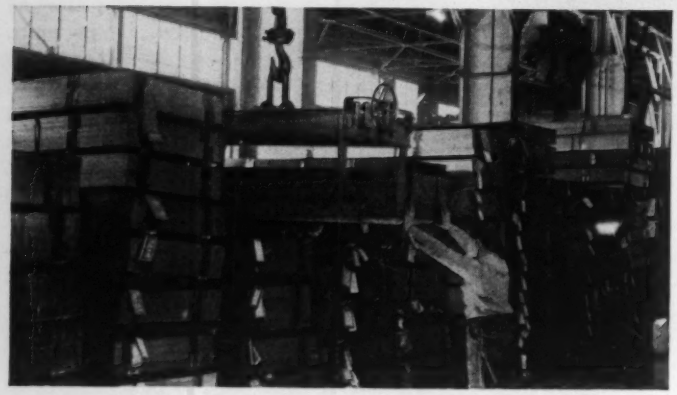
LeBLOND *of Cincinnati*

How Ryerson gives you EXTRA VALUE IN SHEET STEEL

Carbon control—Did you know that Ryerson can furnish a conformance report, if requested when your order is placed, certifying that hot or cold rolled low carbon sheets in stock sizes are SAE 1008 with maximum carbon content of .10? This means you can minimize or eliminate problems of variation in formability and weldability.

Closest cutting tolerances—Our standard "aim" tolerances are the closest in the industry. For example, on shearing of sheets: width or length tolerance—under 48″, -1/32″; 48″ and over, -1/16″. These limits can be guaranteed upon specific request, given in advance of processing your order.





Fast, dependable service—Hundreds of customers often cite these two major reasons for ordering from Ryerson: absolute confidence in "dependability of service as promised," and speed of service to meet their most critical requirements.

Whatever your sheet and strip requirements, a Ryerson specialist is ready to consult with you. A phone call is all it takes.

METALOGICS
RYERSON PLUS VALUES

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

RYERSON STEEL

Joseph T. Ryerson & Son, Inc., Member of the INLAND Steel Family

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Blough Urges Industry to Aid in Solving Payment Problem

"When government has done all that it safely can do to curtail the expenditure of public funds abroad, it will be up to us — in business — to do the balance of the job by increasing our sales of goods and services in competition with foreign producers in the markets of the world." That's how Roger M. Blough, chairman, U. S. Steel Corp., sees industry's mandate to solve the balance of payments problem. He points out four steps you can take: 1. Innovation. 2. Improve quality. 3. Reduce costs and raise productivity. 4. Intensify effective salesmanship and develop new forms of customer appeal and customer service.

How Five Industries Are Faring

The American Gear Manufacturers Association index for October stood at 219.9 (1947-49 = 100)—an increase of 11.1 per cent over September . . . The National Industrial Distributors' Association says November sales dropped 7.3 per cent below the October mark . . . Makers of commercial steel forgings had an order backlog of 277,000 short tons at the end of October—8 per cent below the month-earlier mark and down 26 per cent from the year-earlier level, says the Commerce Department . . . The Can Manufacturers Institute reports metal can shipments in October rose 8.8 per cent above the year-earlier mark . . . Factory shipments of gas water heaters hit 162,900 units in November, down 18.2 per cent from the November, 1959, pace, Gas Appliance Manufacturers Association notes.

Westinghouse's Cresap Expects Sales to Rise in '61

"For Westinghouse Electric Corp., billings in 1961 are expected to increase for the fourth consecutive year, but the challenge to management will continue to be intense cost-price pressure on profits," declares Mark W. Cresap Jr., president. He says sales of electrical products for commercial and industrial construction will remain stable. He believes 1961 shipments of generating apparatus will slightly exceed those of 1960—a good indication since generating apparatus often indicates the total volume of capital goods shipments. He expects consumer purchases of appliances will be up slightly in '61 vs. '60. He looks for an upturn in appliance sales during the second half.

New Way to Make Alloying Agent

Kennecott Copper Corp. has developed and patented a new acid process for the production of high grade molybdenum oxide, used as an alloying agent

Technical Outlook—Page 57 Market Outlook—Page 79

in steel. The process is particularly suited to the treatment of lower grade molybdenite concentrates than can be treated by present processes.

Reynolds Sees Big Year for Aluminum

"It appears that customer inventories are now nearing bottom and, during 1961, domestic shipments of aluminum should increase. Some decline in exports from record 1960 levels may be expected to offset domestic gains." So says R. S. Reynolds Jr., president, Reynolds Metals Co. Primary production of aluminum will hit a record 2.02 million tons this year, up from 1.95 million last year. Mr. Reynolds says nearly all the 1960-61 output of frozen orange juice concentrate will be packed in aluminum cans.

Three New Steels Announced

Armco Steel Corp. is marketing two, new, columbium bearing, high strength steels that offer minimum yield points of 50,000 and 45,000 psi. They're available in plates, hot rolled sheets, and hot rolled strip. Crucible Steel Co. of America has developed a new, high speed tool steel—Rex 49. It's for use in machining hard-to-cut metals, such as stainless steel, superalloys, and titanium.

Litchfield Hints: Higher Aluminum Prices

"Demand for aluminum products remains so strong that we'd all be in good shape if price levels were such as to make possible an adequate return on the industry's large investment," asserts Lawrence Litchfield Jr., president, Aluminum Co. of America. He adds: "We hope the pricing low point was touched this year and that firmer prices, at higher levels, can be established during 1961." He points out that 1960 shipments of aluminum in all forms by domestic producers will approximate 2.3 million tons.

Ill? Swallow the Diagnostician

Dr. Edward G. Witting, deputy director of Army research, has suggested using microminiature circuits, similar to those employed in satellites to transmit information from outer space, to solve medical diagnostic problems. The circuits could be swallowed (and discharged) or injected (and withdrawn). They would telemeter physiological data to the examining physician.

In the Wake of the Price Fixing Cases . . .

Westinghouse Electric Corp. and General Electric Co. have initiated cooperative studies with utilities and other customers to voluntarily determine whether alleged violations of antitrust laws by employees of the companies were financially detrimental to the customers.

Engineers Use Dynapak for Explosive Forming

Convair Div., General Dynamics Corp., introduced its Dynapak as a compact machine that uses pneumatic power to fire a ram at ultrahigh energy rates to form metal. Now, the same machine uses a principle of explosive forming. Water, hit by the ram, delivers forces evenly over the workpiece. The technique is turning out 3 in. diameter end caps from blanks 3/32 in. thick (photo) without the excessive thinning or misforming common to conventional die techniques.

Electronics Industry to Set Another Record in '61

The electronics industry, which is chalking up record sales of $9.75 billion this year, will enjoy a 6 per cent gain next year—to $10.3 billion, predicts L. B. Davis, president, Electronic Industries Association. He looks for a 5 per cent jump in sales of consumer products (to $2.2 billion), a 9 per cent hike in industrial products (to $1.9 billion), a 6 per cent rise in military products (to $5.3 billion), and steady sales in replacement parts (at $900,000).

Raytheon Unveils 'Cook-It-Yourself' Cafeteria

Two young ladies at Nuclear Metals Inc., try the firm's new "cook-it-yourself" cafeteria developed by Raytheon Co. The system features Radarange ovens which use radar beams to heat precooked, refrigerated dinners in one minute. Raytheon predicts that more than 3000 plants will have electronic cafeterias by 1965. Geophysics Corp. of America and Cannon Electric Co. also are using the electronic units.

New Space Communications System Announced

Ultracom, a new system that uses ultraviolet light for transmitting signals in outer space, is being developed by Westinghouse Electric Corp. TV picture signals have already been carried by the ultraviolet beam. Dr. Patrick Conley, Air Arm Div. manager, says Ultracom will extend the range of satellite communications up to 50 times that of present methods like radio, TV, and radar.

Library Is Key Research Tool

Ablation, bioastronautics, cryogenics, psychopharmacology, cosmology. Those are five of the subject classifications in Republic Aviation Corp.'s subterranean library. The 11,500 volume unit is valued at $225,000. Each month, the library staff reads, analyzes, and categorizes about 1800 new books, journals, and technical reports from 14 countries (including Russia). It pays off. Example: Careful scrutiny of microfilm copies of captured World War II Ger-

man documents uncovered data that aided the firm in developing ducted fans. About 60 per cent of the library's books are in circulation at all times.

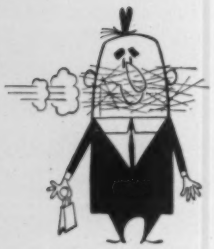
New Zealand's Boom Outruns Its Labor Supply

New Zealand's unemployment has dropped to a record low—600 persons in a labor force of about 900,000. Most of the 600 are unfit for employment. The result is a mad scramble for workers, particularly skilled people, and employers have resorted to bribing employees to keep them on the job. Job openings total 6400, and many workers are changing jobs almost weekly. The government has voted $500,000 to import 20,000 migrants.

Pay TV Gets Boost in West

The Federal Communications Commission has authorized International Telemeter Co., a division of Paramount Pictures Corp., to test a new, over the air, pay TV system on KTLA-TV, Los Angeles. Paramount is already experimenting with cable transmission of pay TV.

Straws in the Wind



Business failures reached a postwar high of 360 in the week ended December 8, reports Dun & Bradstreet Inc. . . . Personal income leveled off at an annual rate of $409.5 billion in November, after rising for eight consecutive months . . . Birmingham public schools, in the midst of an $8.5 million construction program, have announced they will use no foreign steel . . . The net working capital of U. S. corporations rose by $1.3 billion in the third quarter to a record $132.5 billion, says the Securities & Exchange Commission . . . Crucible Steel Co. of America has established an Australian company to begin warehouse operations . . . Shipments of cast iron pressure pipe and fittings in 1961 will rise 1 per cent above the 1960 level, predicts the Commerce Department . . . The Commerce Department estimates that 1961 auto production will total 5.8 million units—vs. 6.7 million this year. The projection is well below industry estimates . . . Typewriter makers, whose '60 sales registered a nice gain over those of '59, look for an even better year in '61. They also see some widening of profit margins, thanks to drastic revisions in production operations.

Metalworking Pulse

The Business Trend: Slight downturns in auto and steel output and in freight carloadings pulled STEEL's index down 1 point in the latest week figured. Electrical output gained a bit. **Autos:** Production dropped about 4000 units as several Ford and GM plants were hampered by snowstorms for two days. Compacts accounted for nearly 32 per cent of total output. Steel: Mills cut ingot tonnage to 1,335,000 net, a new low for the year to date.

- **INDUSTRIAL PRODUCTION**
  - Week ended Dec. 17 . . . . **149†**
  - Year ago **180**

  Details on Page 47
- **PASSENGER CAR PRODUCTION**
  - Week ended Dec. 24 . . **130,000***
  - Year ago **103,219**

  Details on Page 44
- **INGOT PRODUCTION RATE**
  - Week ended Dec. 25 . . **46.9%†**
  - Week ago **48.7%**

  Details on Page 82

†Preliminary. *Estimated.

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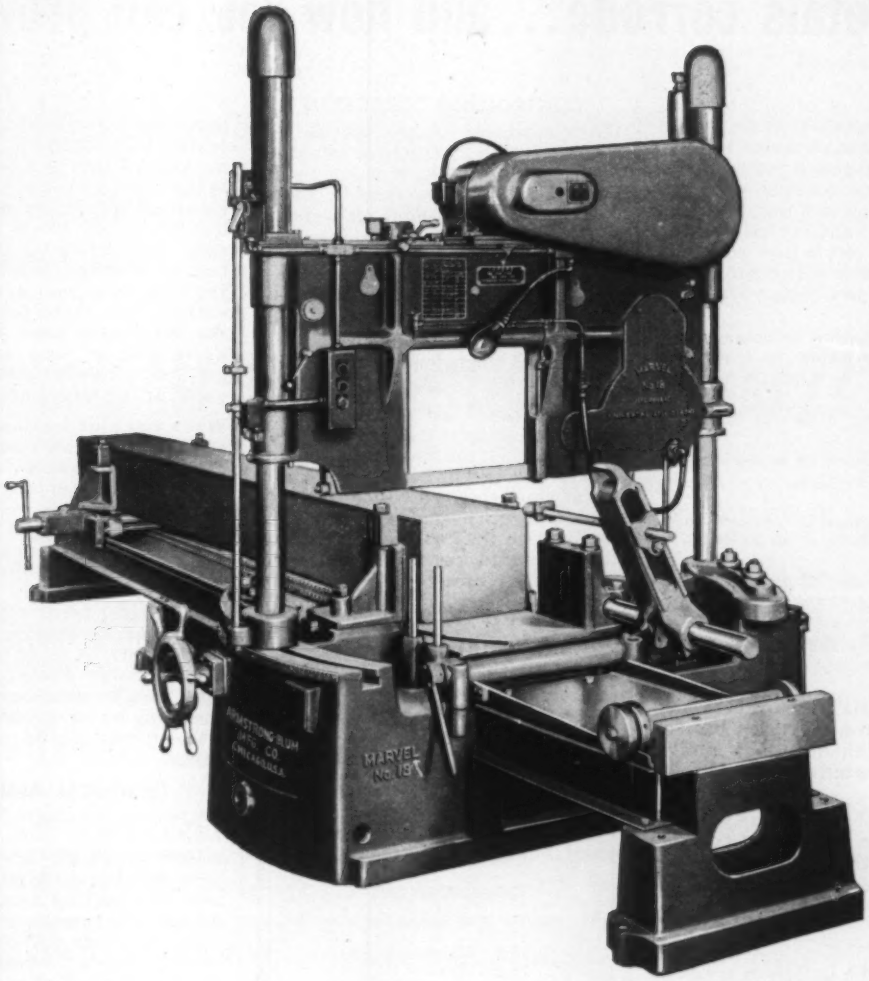


No Job too big or too tough . . .

for MARVEL "*Giant*" Hack Saws

These giant MARVEL Hydraulic Hack Saws (No. 18, Capacity 18" x 18"; and No. 24, Capacity 24" x 24") were *basically* designed for rapid and economical cut-off of BIG WORK. They are not merely "conventional" designs "stretched" to big capacity. They are truly designed and built with the ruggedness and rigidity necessary to withstand the rough treatment of sawing big work, even though the work is in the "toughest of the tough" alloys.

They are reliably fulfilling the cut-off requirements in innumerable steel mills, forge shops, structural shops, warehouses, and machine shops, with assured low tool cost and minimum kerf loss of steel.

In addition to cutting-off, they are reducing costs by eliminating further machining operations. Heat treated die blocks are being reclaimed for re-sinking by sawing off the worn face; columns, beams, pipe, and tubing are being sawed to *finished*, square ends, eliminating milling; angular sawing is done conveniently by swinging the upper structure on the base, to any angle up to 45 degrees—*without moving the work*.

Contemplating the modern trend toward ever tougher steels and larger sizes, these are the logical sawing machines to buy, not only for today's needs but for tomorrow's as well.

Write for Catalog

MARVEL *Metal Cutting* SAWS
Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

Why metals corrode...and how you can prevent it

The basic cause of corrosion is the instability of metals in their refined state. Metals tend to revert to their natural states through the processes of corrosion. For example, when you analyze rust, you will find it is iron oxide. When you analyze natural iron ore, you find it, too, is iron oxide. Six forms of corrosion which can attack the equipment you design are:

1. General tarnishing or rusting with occasional perforations in highly affected areas.

2. Highly localized attack by pitting.

3. Cracking induced by a combination of stress and corrosion.

4. Corrosion confined to crevices, under gaskets, or washers, or in sockets.

5. Corrosion of one of an alloy's constituents leaving a weak residue.

6. Corrosion near the junction of two different metals.

In all of the six forms of corrosion mentioned above, corrosion has the same basic mechanism. It's similar to the electrochemical action in a dry cell.

The electrolyte in the dry cell corresponds to the corrosive media, which may be anything from the moisture in the air to the strongest alkali or acid.

The plates of the battery correspond to the metal involved in corrosion.

A potential difference between these metals or different areas on the same metal causes electricity to flow between them through the electrolyte and a metallic bridge or contact that completes the circuit.

At the anode, a destructive alteration or eating away of metal occurs when the positively charged atoms of metal detach from the solid surface and enter the solution as ions.

The corresponding negative charges, in the form of electrons, travel through the metal, through the metallic bridge, to the cathode.

Briefly then, for corrosion to occur, there must first be a difference in potential between the metals or areas on the same piece of metal so that electricity will flow between them. Next, a release of electrons at the anode and a formation of metal ions through disintegration of metal at the anode. At the cathode, there must be a simultaneous acceptance of electrons. Action at the anode cannot go on alone, nor can action at the cathode.

CONTROLLING CORROSION

When corrosion occurs because of the differences in electrical potential of dissimilar metals, it is known as galvanic action. Differences in potential from point to point on a single metal surface causes corrosion known as local action.

When you plan against galvanic corrosion it is essential to know which metal in the couple will suffer accelerated corrosion . . . will act as the anode in the corrosion reaction.

The galvanic series table shown below can supply this information. In any couple, the metal near the top of this series will be the anode and suffer accelerated corrosion in a galvanic couple. The one nearer the bottom will be the cathode and remain free from attack or may corrode at a much slower rate.

GALVANIC SERIES TABLE

Magnesium
Magnesium alloys
•
Zinc
•
Aluminum 25
•
Cadmium
•
Aluminum 17ST
•
Steel or Iron, Cast Iron
•
Chromium-iron (active)
•
Ni-Resist
•
18-8 Stainless (active)
18-8-3 Stainless (active)
•
Lead-tin solders
Lead, Tin
•
Nickel (active)
Inconel* (active)
•
Brasses, Copper, Bronzes
Copper-nickel alloys, Monel *
•
Silver solder
•
Nickel (passive)
Inconel (passive)
•
Chromium-iron (passive)
18-8 Stainless (passive)
18-8-3 Stainless (passive)
•
Silver
•
Graphite, Gold, Platinum

HOW TO USE THE CHART

Notice how the metals are grouped in the galvanic series table. Any metal in one group can be safely used with any other metal in the same group. However, when you start mixing metals from different groups, you may run into serious galvanic corrosion of the metal higher on the list. And the further apart these metals are listed, the worse this corrosion may be.

But, if you have to mix metals, pay particular attention to the electrical contact between them. Eliminate any metallic bridges or contacts of metal to metal that will permit the flow of electrons through them. You can do this by separating the metals physically, or by using insulation or protective coatings. Another factor is the relative areas of the metals in contact with each other. Parts having the smaller area should be of a metal with a lower listing on the galvanic series table than the metal used for the larger area.

When you plan against local action, remember that the corrosion process is galvanic: Electrons move from one point in the metal to another. One of the easiest ways to prevent local action is to use a metal with little or no impurity. When alloys are involved, make sure the constituents are closely listed in the galvanic series table. Local action may also be stopped by the use of protective coatings, which shield the metal from the corrosive media. Environment must also be considered, for its nature may be an important factor in either promoting or restricting corrosion.

TECHNICAL ASSISTANCE

As you can see, many factors are involved in both local and galvanic action. That's why it's best to bring your metal problem to Inco's Corrosion Engineering Service. Available data will be furnished wherever possible . . . tests will be made where needed. Inco's Corrosion Engineering Service will be glad to apply principles of corrosion control to your specific problem.

LITERATURE

The publications listed below will provide more detailed information on how you can combat corrosion by using nickel-containing metals.

Publication Number	Name
A232 . . .	Corrosion Problems in Nuclear Reactor Power Stations
A59	Factors of Importance in the Atmospheric Corrosion Testing of Low-Alloy Steels
A62	A Theory of the Mechanism of Rusting of Low-Alloy Steel in the Atmosphere
A137 . . .	Corrosion by Some Organic Acids and Related Compounds
A144 . . .	Some Observations of the Potentials of Stainless Steels in Flowing Sea Water

A complete list of the 187 Inco publications and technical bulletins on nickel-containing metals can be obtained by writing for "List A", to:

*Registered trademark

The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street New York 5, N.Y.

Is That Letter Necessary?

We have just spent a full Saturday morning (a day we work reluctantly) reading accumulated mail. Most was stuff set aside during the preceding three days because it appeared less than urgent.

● Here's a letter from a staff member thanking a client for the client's thank you letter. (*How polite can we afford to be?*)

● This interoffice memo is addressed to me, but it contains no information I do not already have and which the writer knows I have. (*The memo is a stratagem of the writer to get carbons directed to top executives to show how diligent he is.*)

● A publicity man berates us for not using a story that he and I both know was neither good nor new. In fact, we discussed it by telephone. (*Oh, well, the carbon to his boss will prove he horsewhipped the editor.*)

● A two-and-a-half page, single-spaced communique from our Atlanta man explains in detail why he's too busy to meet our deadline. (*No wonder!*)

● A photocopy of a letter from an important customer, with a carbon of our man's reply. (*Oh, yes, he calls our man by his first name. We photocopy the original so the bosses can see it.*)

● This batch of form acknowledgments—32 of them. (*Well, that's good practice, but why route the carbons to 12 busy people?*)

During the past quarter century, we've written many pleas for better communications. Now we wonder whether communications are getting better, or just more. Has the electronic dictating machine made letter and memo writing too easy? Do the writers forget the cost in the time of the girls who transcribe them and the recipients who are supposed to read them?

We are reminded of the late Earl Shaner who for more than two decades wrote the editorials for this magazine with a stub pencil. His explanation was: "This pencil is my policeman. It keeps me from using unnecessary words."

We fear that too many letters and memos make communications less rather than more effective. We have the same reservation about letters and memos that are too long. Both conditions encourage the fast checkoff — with little attention.

● Now what's this three page, rambling epistle? Too bad the guy didn't have time to write a short letter. (*Oops! Is that my signature?*)

Walter J. Campbell

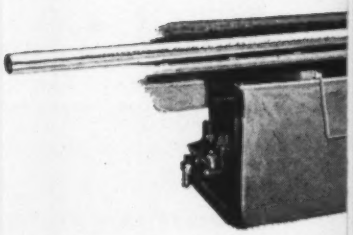
EDITOR

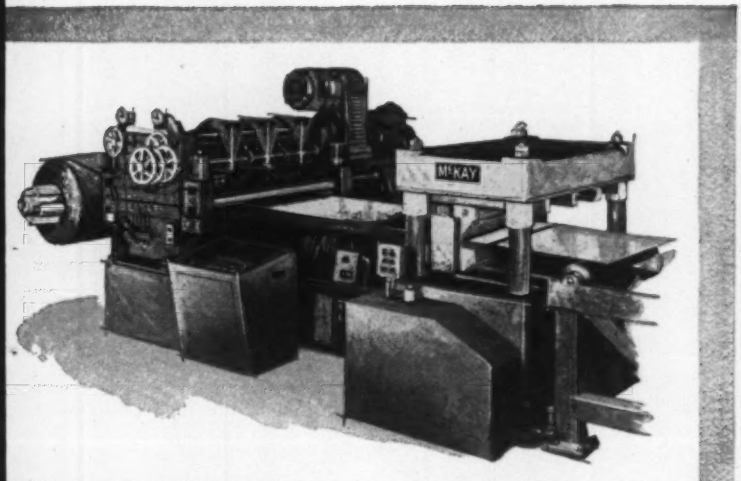
LOOK TO

McKAY MACHINE

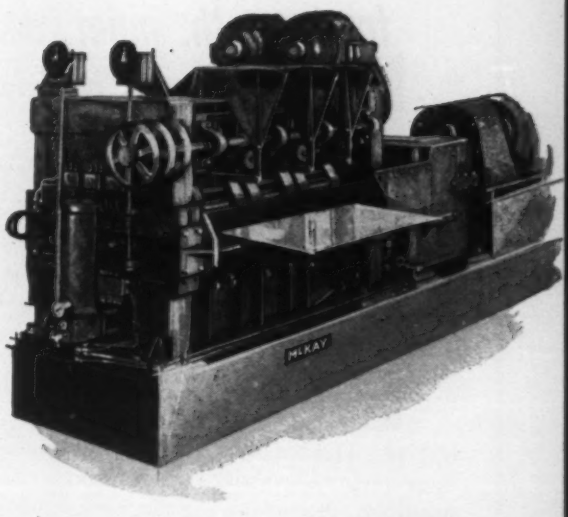
FOR PROGRESS IN METAL PROCESSING

McKAY PIPE MILLS





McKAYMATIC* DIE SHEAR LINES



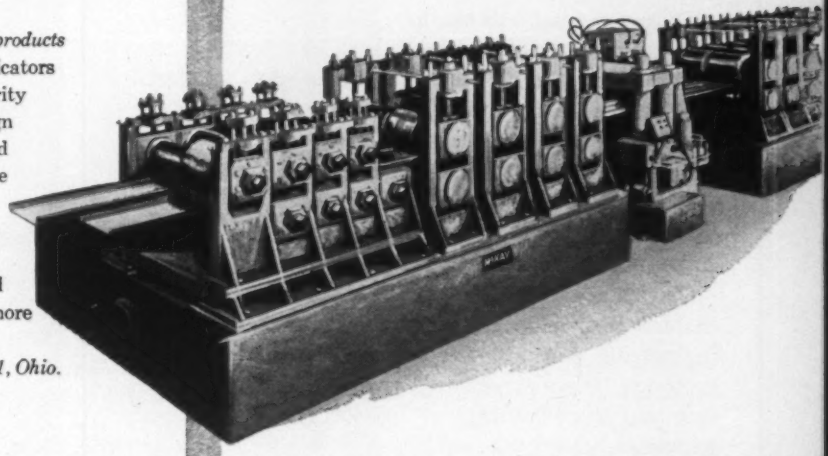
McKAY ROLLER LEVELERS

No machine manufacturer puts more into its products than does McKay. Metal producers and fabricators have learned they can expect and get integrity and honest value—the most advanced design and engineering—the finest construction and service—when they specify McKay Machine metal processing equipment.

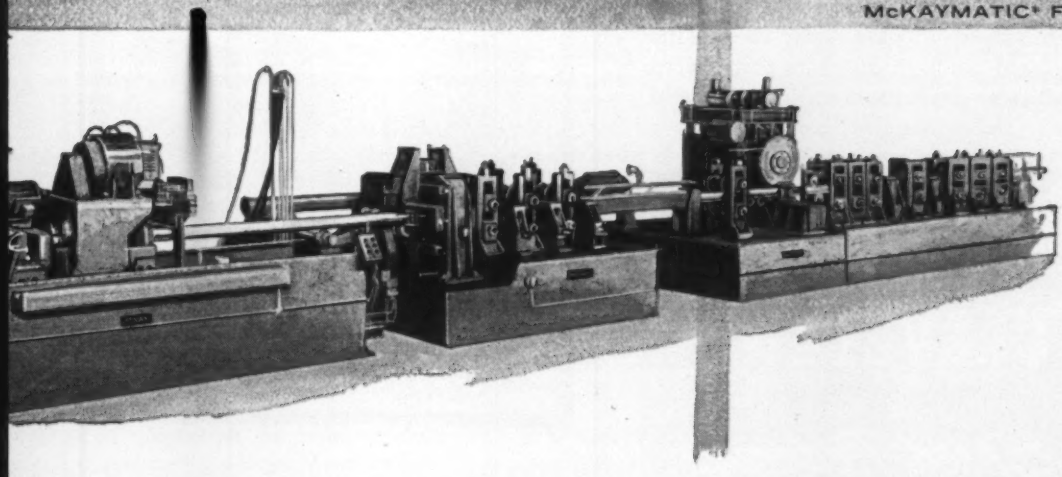
Look to McKay Machine in 1960 for more automatic machines, like those illustrated here, well conceived and skillfully developed to help you do your work faster, better and more economically than ever before.

The McKay Machine Company, Youngstown 1, Ohio.

*TM

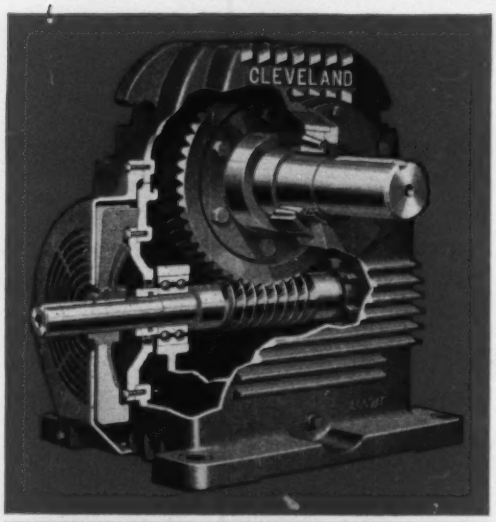


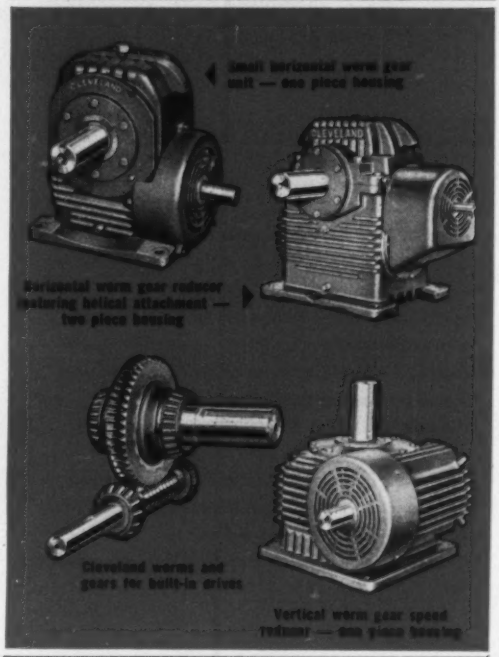
McKAYMATIC* FORMING MILLS



for smooth, quiet, dependable, right-angle power transmission, specify...

HIGHER HP CLEVELAND SPEED REDUCERS




Small horizontal worm gear unit — one piece housing
Horizontal worm gear reducer featuring helical attachment — two piece housing
Cleveland worms and gears for built-in drives
Vertical worm gear speed reducer — one piece housing

During a lifetime of trouble-free service, these versatile space-saving Cleveland's will transmit power uniformly, smoothly, dependably—under even the most severe operating conditions. Clevelands actually improve through use. Thousands of units have outlasted their driven machines.

During the last half century, Cleveland has designed and produced a complete line of standardized and special worm gear speed reducers as well as industrial worm gearing for built-in drives to handle almost every type of power transmission application.

Now, Cleveland's use of fan cooling, centrifugally cast bronze gears and special heat treatment of alloy steel worms permit substantially higher input HP and output torque ratings—with smaller units.

Cleveland's wide knowledge of worm gear capabilities enables their field representatives to offer valuable engineering assistance in solving power transmission problems. These experienced engineers will gladly provide you the advantage of "on location" advice and counsel.

Write today for your personal copies of the up-to-date illustrated Bulletins shown at right. They describe the finest, newly-designed line of higher-horsepower worm and gear speed reducers—available *anywhere* in the world.

Cleveland Worm & Gear Division
Eaton Manufacturing Company
3270 East 80th Street • Cleveland 4, Ohio

EATON

CLEVELAND
Worm Gear
Speed Reducers

AMC's George Romney charges that the failure of all consumers to share in economic progress is slowing our growth. He cites his beliefs on . . .

Industry's Obligation to Consumers

RAMBLER SALES promotion programs generally pack more horsepower than Detroit's typical new model productions. The latest campaign of George Romney, American Motors Corp.'s hard driving president, is no exception.

Some observers feel that the "share the progress" proponents have gained a strong ally and that, as a result, programs like Kaiser Steel Corp.'s labor-management-public committee will gain momentum. The Kaiser committee, headed by Dr. George Taylor, University of Pennsylvania, was set up to recommend a long range plan for the equitable sharing of the company's progress among stockholders, employees, and the public.

With his characteristic intensity, Mr. Romney:

1. Dusted off the crown of King Customer by offering Rambler buyers a rebate program if AMC sales hit a specified level.

2. Charged industry in general, and Ford Motor Co. and General Motors Corp. in particular, with "economic imperialism." (For example, investing overseas for the purpose of competing in the domestic market rather than world markets.)

3. Declared that industry, before moving out of an area to the economic detriment of the people, has an obligation to give them an opportunity to face and solve the problems compelling the decision to move.

• **Customer Rebate** — AMC's program works like this: Rambler (or Metropolitan) buyers taking car deliveries in December, January, February, or March will receive U. S. savings bonds if sales reach a prescribed level above those of comparable year ago periods.

Admittedly, the rebate program is a sales promotion, but Mr. Romney insists it has broader overtones. And most observers don't doubt his seriousness about upgrading and improving business morals and ethics. "The failure of all consumers—including workers, owners, and others—to share in economic progress is slowing economic growth, causing unemployment, and speeding excessive U. S. industrial expansion abroad," says the AMC president.

He charges that labor and government have been the biggest gainers from industrial wealth since 1948—that's why he has instituted the rebate program as an aid to the "neglected consumer."

• **Ducking Responsibility** — Mr. Romney points to Detroit's declining share of automotive employment as an example of the failure

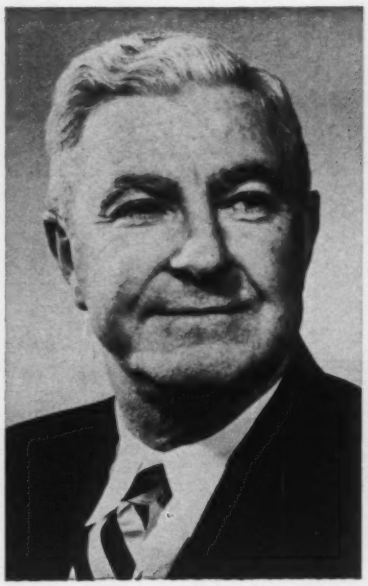
of all consumers to share in economic progress. In 1939, he points out, Michigan had 64 per cent of all automotive employment in the U. S. Today, it's below 40.

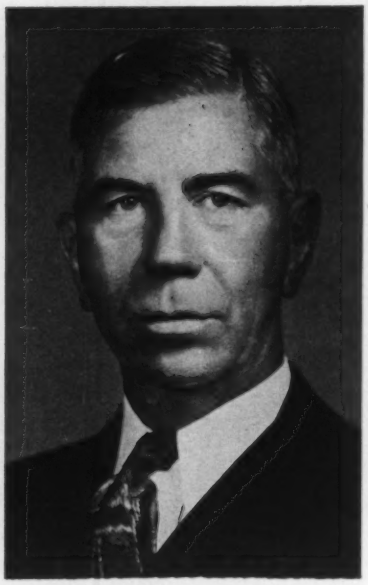
A great deal of the migration out of Detroit and Michigan wasn't the result of decentralization, freight, or other factors, but it was brought about by decisions to get out of an area because of cost-price problems, says Mr. Romney. "People of an area who helped build an industry are entitled to know when basic problems exist that compel economic decisions contrary to their economic interests. I know of no one who brought the Michigan situation to a forceful issue by saying 'we are going to move out unless these issues are met.' Over and above the economic factors is the obligation to give the people and political leaders an opportunity to deal with the issues before acting to their detriment."

• **Export of Capital** — The AMC chief drew a similar parallel regarding the investment of U. S. capital abroad. "In nine years," he points out, "the U. S. share of total auto production has dropped from 72 to 48 per cent.

"Investment of U. S. capital abroad is in excess of that required to meet the needs of foreign markets—it's intended importantly for the penetration of this market from abroad. Certainly, expansion outside was going to occur, but the expansion of vehicle production outside wouldn't have been so great had the U. S. auto manufacturers faced the people of this country with the issues involved in keeping U. S. automobile business as a basis of a world auto business . . . people of this country ought to be told what the economic facts are that make it necessary to base economic expansion abroad rather than at home. I think it's an economic obligation, a moral obligation, and an obligation of a good citizen."

Mr. Romney termed as economic imperialism: International programs based on ignoring national boundaries and establishing 100 per cent ownership to avoid foreign partnerships. He charged that it is a cold, calculated effort to become exempt from national policy and boundaries.





Thomas F. Patton (left) succeeds Charles M. White, who retires, as . . .

Republic Chooses New Chief

THOMAS F. PATTON last week moved up to chief executive officer of Republic Steel Corp., the nation's third largest steel producer.

Mr. Patton, who continues as president, succeeded Charles M. White who announced his retirement as chairman.

"The future of Republic could not be in better hands than those of Mr. Patton and his associates," said Mr. White. A colorful and hard hitting figure in the industry for nearly half a century, Mr. White, 69, will continue as a director of the company and honorary chairman. He will also serve in consulting and advisory capacities.

Under Mr. White's direction (he became president in 1945), Republic's steel ingot capacity was increased from 8,600,000 to 12,732,000 tons per year. He also directed the extension of Republic's raw material reserves here and abroad.

• **Mr. Patton's Outlook**—"It shall be my purpose as the new chief executive officer to continue the progressive, forward looking policies which Mr. White has pursued and which have been so important in the success of the company," said Mr. Patton.

• **In at the Start**—Mr. Patton, 57, has served Republic in management positions and as legal counsel for 30 years. He has been president since 1956.

While with a law firm in 1930, Mr. Patton helped form Republic via the merger of four companies. Six years later, he became general counsel for Republic and its subsidiary companies. In 1944, he was made vice president and general counsel. He has been a board member since 1943.

Mr. Patton is also a director and president of Union Drawn Steel Co. Ltd. and a director of Iron Ore Co. of Canada, Liberia Mining Co. Ltd., Reserve Mining Co., Ress Realty Co., R-N Corp., Tankore Corp., Union Commerce Bank, Standard Oil Co. (Ohio), and Ohio Bell Telephone Co.

The election of George M. Feiel as vice president-comptroller and Willis B. Boyer as vice president-treasurer was announced by Mr. Patton.

New Trademarks Symbolize Hotter Marketing Race

IN 1961, Armco Steel Corp. will be sporting a new trademark on its advertisements, letterheads, business forms, products, packages, signs, and displays. An up-to-date version of the inverted triangle Armco has used for 46 years, it was designed by Lippincott & Margulies Inc., New York. (The same firm worked on the U. S. Steel corporate identity program.)

The move is further evidence of the steel industry's changing marketing philosophy.

• **Building an Image**—W. B. Quail, Armco vice president- distribution, explains it this way: "The trademark is a marketing tool. We want to get away from the concept that steel is something old and heavy that rusts. Instead, we want to create the image that steel is aggressive and modern. We've always had the products, but up until now we didn't know how to sell them."

Adds Logan T. Johnston, Armco president: "Look behind these new trademarks, and you will find they actually represent more modern and dynamic expressions of what has been going on for some years in steel — a continuing flow of new ideas from research and increasingly aggressive merchandising of special products."

Armco's change in corporate image goes farther. It has meant some management changes. It has also meant incorporating subsidiaries and affiliates into divisions along the pattern set by U. S. Steel. The Armco owned National Supply Co. has become a division. Union Wire Rope Corp. has been integrated into the Sheffield Div.

Armco estimates that no less than 102 different letterheads were in use throughout the corporation last year. Similar differences were noted in business forms, packaging, signs, and exhibits. Divisionalization, Armco hopes, will give it a more unified appearance to the "publics" to which it sells.

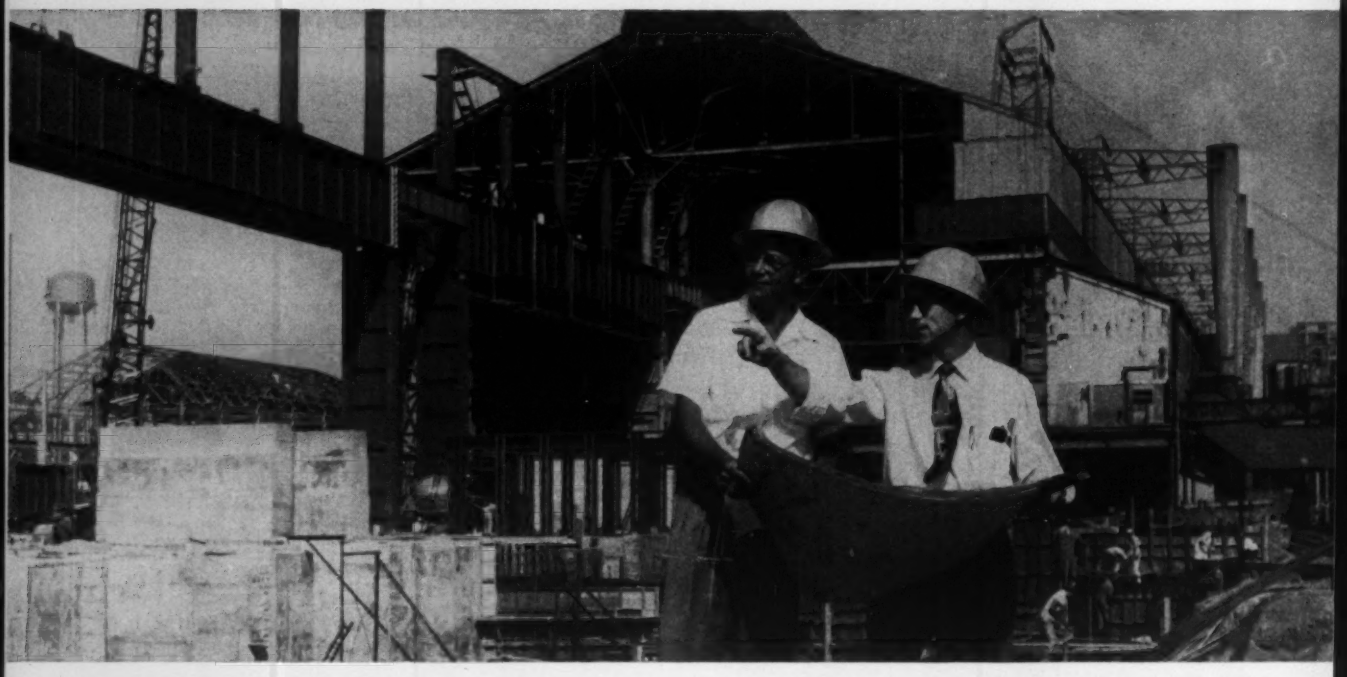
• **The Challenge** — It's no secret that the steel industry has become increasingly worried about competition from aluminum and plastics, from two old competitors (lumber and concrete) that are making strong comebacks, from such relative youngsters as ceramics and newer metals. Foreign stelmakers are upping their capacity and have ardently wooed the U. S. consumer.

The answer: "Aggressive marketing that will keep our industry healthy, growing, and virile," says Mr. Johnston. "The new mark gives expression to our determination to keep moving forward."

• **Youngstown Too** — The same philosophy is echoed by Youngstown Sheet & Tube Co., which has been working the past year with the New York design consulting firm of Gerald Stahl Associates Inc. on a corporate identity program. Though Youngstown hasn't made any official announcements, its upcoming trademark change will "crystallize" other steps the company has taken to achieve its new "market strategy," says a company spokesman. They include:

1. Appointment of additional vice presidents, and assistant sales managers in each product line.
2. More advertising, promotion, and publicity.
3. A change in product mix. Youngstown is re-entering the galvanized sheet business, constructing new light gage tin plate facilities; modernizing a 79 in. hot strip mill to get larger coils; expanding electrical-mechanical tubing facilities.
4. Expanding research and development in terms of physical plant and people.

Logan T. Johnston (seated), president, and W. B. Quail, vice president-distribution. New trademark is in background



Plan Your New Plant for Profit

AN ESTIMATED $50 billion will be spent by industry in the next decade for industrial expansion. Speakers at the First International Building Exposition & Congress offered these suggestions for getting the most from your construction dollar.

• **Build in Flexibility**—Plan your plant for maximum flexibility for two reasons, says Joseph C. Nowell, manager of engineering, General Electric Co.: 1. To provide for changes in manufacturing methods and material handling, plus redesign of some products and development of new ones. 2. To provide for growth or "expandability."

"Selection of the most favorable community is ordinarily the first order of business in planning a new plant, and that's a good place to start considering flexibility and expandability," says Mr. Nowell. Is the community large enough to provide an adequate supply of skilled workers for future needs? Can it provide the auxiliary supplies and services needed for the future? Will engineers, managers, and researchers be satisfied to live there?

It may save headaches (if your work force is likely to grow substantially) to build on or close to a main traffic artery. Stresses Mr. Nowell: "Even at this early stage it's advisable to study and lay out the ultimate parking and traffic requirements. It's often easier to negotiate adequate roadway widening, traffic lights, and other similar items, with the city, county, or the state before you announce your decision to locate in their fair community."

• **Both Trucks and Trains**—You'll be doubly sure of getting the best and most economical transportation service to and from the plant if you pick a site readily accessible to rail service. Not only will this give you the obvious advantages of having two forms of transportation to choose from, it may increase the value of your plant if you ever want to sell.

• **Get Enough Land**—Buy a site big enough for future expansion. General Electric has recently been using a ratio of ten acres of land for each acre of floor space in the initial plant, says Mr. Nowell. "This readily permits us to double (or even further increase) the building areas in the future and, at the same time, leave ample room for roads, parking areas, and miscellaneous service buildings."

To save money you might consider building on land that would have been undesirable a few years ago. Poor topography does not present the barriers it used to because of advances in the economical use of earth moving equipment, suggests Ralph W. Boone, construction supervisor, Dow Chemical Co.

Utilities: Assure Capacity, Provide for Growth

● POWER

Can present generating facilities handle future as well as initial requirements? How reliable will the service be? (Usually, the greater the distance from the generating plant or main transmission substation, the less reliable the service.)

● STEAM

Design the plant with reserve capacity and flexibility to handle future load increases through the addition of new boilers as necessary.

● WATER

Determine future water requirements for manufacturing, fire protection, human consumption. Negotiate with local officials, prior to any commitment for the plant, for an adequate supply. Check with your insurance company for its requirements.

● DRAINAGE

Plan for storm drainage and sewer lines before starting construction. Allow space for later expansion—it requires little additional labor and material to install a 10 in. line rather than an 8 in. one. But the increase may be enough to avoid tearing up the place in two or three years to get larger capacity.

Flexibility Inside

You can save money by planning for future expansion inside the plant as well as out. "For flexibility in the ever-changing manufacturing operation we should provide adequate bay spacing and clear height at the lowest investment cost," suggests William F. Reardon, design standards engineer for General Electric. For normal, light manufacturing operations (involving conveyorized systems), a 30 ft by 60 ft bay fits the criteria of flexibility at low cost, says Mr. Reardon. "In this system we use a truss on the 60 ft span and cantilevered purlins on the 30 ft one. To make the space between trusses more usable, we have usually been able to eliminate lower chord bracing (except for an occasional knee brace at mid-span and portal bracing on the column line)." The additional space, says Mr. Reardon, will handle conveyor crossings and equipment like dust collectors, air handling units, unit heaters, which otherwise would take up valuable manufacturing space.

Plan layout of machinery and material handling equipment with future expansions in mind. Study use of movable partitions for greater flexibility. Early in the planning pick out location of trucking and rail facilities so these will not have to be ripped out and relocated in the future, suggests Mr. Reardon.

● **Modernize or Build?**—These techniques will give you some facts on which to base your decision, says Grayson H. Grossnickle, staff assistant, Westinghouse Electric Corp., Newark, N. J.: Make a complete manufacturing analysis of the way and sequence in which you are now performing your operations. Make and analyze flow charts of the material flow from the time it is received until shipped. Make area layouts for the various departments of present activities.

By working backward (from finished product to raw material) on the analysis and flow charts, new charts can be developed, says Mr. Grossnickle. The number and variety of machines can be determined.

"Three dimensional layouts should be made and used in any major rearrangement work. They are of real value in determining the correct layout and convincing your organization that the proposed layout will work.

"From the three dimensional layouts, accurate rearrangement costs can be determined. From the old and new operation analysis charts the savings can be determined."

Write a Good Contract

Once you're ready to start building or modernizing, you can save time, money, and lots of grief by one carefully planned step: A concise, definitive contract with your architect-engineer and contractor.

A good contract bears these marks, says Oscar S. Bray, president and chief engineer, Jackson & Moreland International Inc., Boston: "It spells out in unmistakeable language the responsibilities, rights, and duties of the parties, the time and manner of performance, and the amount and terms of payment. Where termination before completion is a possibility, the conditions under which they may take place and the terms must be spelled out. Where possible, future sources of dispute must be identified and elim-

inated. Provision should be made for settlement of unforeseeable questions without resort to the courts."

The good contract requires adequate drawings and well written specifications. They fix the extent and character of the work and determine the amount of extra work (by their clarity and completeness, or lack of it), says Mr. Bray.

• **The Follow Up**—As construction on your plant progresses, maintain checks on the quality of work, whether it's going according to schedule, and how much it's costing you.

Says James L. Mays, general supervising engineer, Caterpillar Tractor Co.: "The first step which the owner's representative can take in successfully controlling quality is to make sure that the owner's intent has been clearly defined."

To avoid trouble: Be certain that the quality of materials and workmanship is no more or less than required, and that standards expected are clearly specified. Make sure materials and manufactured items are submitted in sample form and approved before installation.

To see the project stays on schedule, suggests Mr. Mays: 1. Require the development of a complete job schedule compatible with your occupancy requirements. 2. Stay on schedule by using a frequent check system such as the nearby schedule (work to be done for the next two weeks), long range schedule (delivery dates for key items of material and equipment, starting dates for various subcontractors, etc.), and frequent meetings with the contractor. 3. Establish adequate liaison between contractors, designers, and others involved to assure timely flow of information. 4. Don't allow "necessary revisions" to make the schedule a scapegoat for poor planning.

• **Controlling Costs**—Mr. Mays suggests for a lump sum contract: 1. A careful preaward check of contract documents to assure adequate provision for adjustments in contract amounts. 2. Assurance that the breakdown of the contract amount will keep progress payments in direct relation to actual progress. 3. Enough inspections and complete familiarity with each phase of construction to insure the contractor's requests for progress payments are in line with actual job progress.

For cost plus fee contracts: 1. Close contract with field operations to assure the highest possible degree of efficiency in the use of labor and equipment. 2. A system of checking the contractor's daily labor and material receipts.

Frequent specification changes send construction costs spiralling. So does use of custom fixtures and accessories. Wherever possible, use standard doors, windows, plumbing and lighting fixtures, conduit, pipe.

• **For a Quick Startup**—The advantages of getting the plant into production as quickly as possible are obvious. John M. Waligora, chief engineer for Merck, Sharp & Dohme Div., Merck & Co., West Point, Pa., suggests gradual occupancy as one step. "It lessens the problems of moving all at once; it provides a nucleus of people to help orient the main body of workers to follow; it shows the construction people you mean business about living up to your occupancy schedule; and it generally uncovers many of the bugs that can be corrected before the main operation starts."

Set up procedures to test pipe lines, air conditioners, air compressors, cooling towers. Order equipment soon after the construction contract is let. Make provisions on the building site for storage of equipment that will arrive before it can be placed in position.

• **Cleaning Up**—Your operations will run a lot smoother if you clear up adjustments and repairs as soon as possible after moving into the plant. Here are the 12 most common: 1. Balancing of air conditioning. 2. Noise of vibrations in equipment, piping, and air conditioning systems. 3. Leaking pipes. 4. Sticking doors. 5. Lighting. 6. Roof leaks. 7. Leaks through windows, doors, and panel walls. 8. Improperly sloped floors. 9. Floor cracks. 10. Motors (rotations and amperages should be checked promptly). 11. Paint touchups on inside and outside. 12. Debris and trash.

Building a new plant or addition to an existing one is expensive. Poor planning, co-ordination, and follow-through on details can make costs skyrocket. You'll get the most for your construction dollar if you start right: Set up thoroughly thought-out goals; then designate the procedures, personnel, and lines of authority to carry them out.

Mergers: When Are They Challenged?

MARKET EFFECT, not size, gets the attention of government antitrust watchdogs of merger activities, stresses the National Industrial Conference Board in a study, "Mergers and Markets."

The watchdogs are the Federal Trade Commission and the Antitrust Division of the Justice Department. They work under Section 7 of the Clayton Act.

The study finds vulnerability exists in these areas:

• If the acquiring company's sales and assets exceed $10 million and it is one of the top companies in its field.

• If the acquired unit is also one of the major firms in its field.

• If a high percentage of the products or services in question is concentrated in relatively few companies.

Mergers appear least vulnerable if neither party has more than $10 million in sales or assets, if neither ranks higher than tenth in its field, or if neither is engaged in a highly concentrated line of business.

• **Patterns** — In its analysis of 57 cases in which acquisitions were challenged, the NICB study found certain emerging patterns:

• Acquisition of whole companies or whole divisions have been challenged with greater frequency than partial acquisitions.

• Horizontal mergers (between companies making similar products or products that are substitutes for each other) have been questioned far more often than vertical mergers (between companies standing in a supplier-customer relationship) or conglomerate mergers (all other types).

• Almost one-third of the cases involve companies in closely related, if not identical, fields.

• About three-fourths of the cases concern national markets.

Painting Equipment Sales Climb

PAINT SPRAYING equipment manufacturers will record a 10 per cent gain in sales this year despite a decline in orders from two of their largest customers—steel producers and automakers.

Industry sales, according to company executives, will total about $50 million this year for the paint spraying equipment alone—nozzles, guns, hoses, paint containers, compressors. The total might reach $100 million if the custom built equipment, conveyors and handling devices, ovens and other auxiliary equipment needed for the large complete finishing lines were included.

Sales estimates from companies range from "equal to 1959 level" to a 30 per cent increase. All equipment makers are optimistic about 1961 business, predicting increases of 5 to 20 per cent over 1960 levels.

H. G. Fischer & Co., Franklin Park, Ill., more than doubled its sales this year and believes that 1961 volume may double that of 1960. A. C. Walberg, general manager of the Electrostatic Div., attributes the phenomenal sales rise to a new, supercharged, electrostatic spray gun his company has developed.

• **Rising Costs Hike Prices**—Several manufacturers increased prices for their equipment in 1959 and 1960. One company that boosted prices 10 per cent this year anticipates increasing them a like amount in 1961.

Another firm which has held prices on major lines for a couple of years is starting to charge for installation-supervision service which runs beyond a certain number of days. Previously, such service was not limited in time, and no charge was made.

Price competition is no stranger to makers of spray painting equipment—it is stiff in both custom equipment and standard units.

In some companies, increased labor and material costs have forced prices higher; in others, management has found ways to absorb them. W. Herdlein, vice president of R. C. Mahon Co., Detroit, says: "We have streamlined our methods with new engineering and office procedures, new equipment, and redesign." Metalwash Machinery Corp., Elizabeth, N. J., explains: We have found that we have been able to increase our productivity to allow us to absorb increased costs.

Two of the big buyers of industrial paint spraying equipment—autos and steel—have not purchased to the extent they were expected to this year. However, four others (furniture makers, painting contractors, general manufacturing, and maintenance painters) have been buying aggressively.

• **More Automation Coming**—Two trends in paint application are evident; greater use of electrostatic spraying techniques and more demand for automatic and complete finishing lines. Sometimes, buyers specify electrostatic painting in an automatic line.

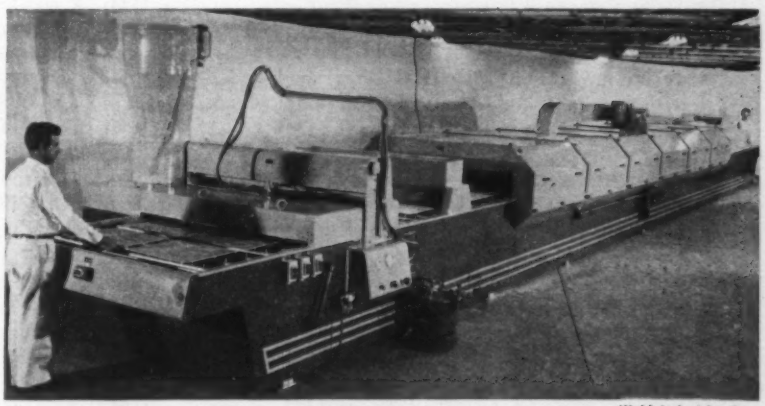
Ransburg Electro-Coating Corp., Indianapolis, believes industry is growing more concerned with quality and the cost of finishing. Prospective buyers are carefully appraising all materials, processes, and equipment related to the finishing of their product. More specialized application engineering and more complete automation of the finishing lines can be expected next year, officials predict.

Granco Inc., Grand Rapids, Mich., is installing a complete finishing system in a customer's plant alongside another system the painting equipment maker installed a couple of years ago. Don A. Jacobson, president of Granco, explains the customer is sold on automation and uses it wherever possible.

• **Airless Process**—Another development in the industry has been hydraulic or airless type painting without heat. Elimination of air to atomize the paint gets rid of overspray or bounceback, bringing increased economies in the amount of paint used. The need for masking and cleanup is minimized.

Gray Co. Inc., Minneapolis, says that recent advances in the design and manufacturing knowhow of this equipment will allow the painter to achieve fine finishes and do highly decorative work.

Wald Industries Inc., Huntingdon, Pa., has developed an automatic sign shop for cities and state highway departments. One man loads the sign blanks in the machine where they are sprayed with a binding paint, then patterned with reflectorizing glass spheres. Infrared heat bakes on the coatings, and a cooling unit makes them ready to unload on the other end.



Wald Industries Inc.

AUTOMATIC SIGN SHOP for cities and state highway departments. The entire operation is automatic: Sign blanks are sprayed with a binding paint, patterned with reflectorizing glass spheres, baked under infrared lamps, and cooled

'Buy American' Issue Still Boiling...Kennedy Mum on Budget Balancing...New Space Materials Guide Coming

● 25% 'BUY AMERICAN' DIFFERENTIAL?—Proponents of a bigger differential between domestic and foreign bidders for U. S. government contracts (it's usually 6 per cent now) took heart from a Defense Department directive last week. It established a 25 per cent differential on products or technical services to be used overseas. Exemptions are few: Canada, Korea, and Okinawa. Some $65 million is expected to be saved in line with the current campaign to stop the outflow of gold (STEEL, Dec. 19, p. 71).

On Capitol Hill, Sen. Everett Dirksen (R., Ill.) is predicting that Congress will establish a special commission to review the whole "Buy American" issue. The 25 per cent differential (in lieu of the present 6 per cent, plus another 6 per cent in a labor surplus area) represents the fondest hopes of the "Buy American" group.

● BUDGET POSSIBILITIES—Maurice Stans, outgoing director of the Budget Bureau, challenges the Kennedy administration with this federal budget formula: Present tax rates, relatively full employment, and some real growth will make federal receipts $120 billion by 1970 (vs. about $80 billion now).

President-elect Kennedy declines to say whether he'll submit a balanced budget after he takes office. His concern: Rising unemployment and a sputtering economy. He said the outlook is good for congressional approval of measures to provide medical care for the aged under social security, to begin federal aid to education, to raise minimum wages, to help depressed areas, to provide a new housing program.

● SPACE MATERIAL NEEDS—A new guide to material requirements for spacecraft will soon be available from the Materials Advisory Board, (MAB) National Academy of Sciences-National Research Council. It will go to corporations with "the need to know" and Defense Department and National Aeronautics & Space Administration (NASA) authorities in the materials field.

Clearance to receive the detailed study will be handled by Col. Preston L. Hill, chief, Manufacturing & Materials Technology Division, Directorate of Production, Air Materiel Command, Wright-Patterson Air Force Base, Ohio. Warren Eding, MAB staff aeronautical engineer, told STEEL the survey "will go to as many people as possible." The wider the distribution, the more valuable the returns to the national interest.

Basically, the study spells out 20 year material goals for 29 classes of aircraft, missile, and space vehicles. Component needs of each class are established in detail (for example, down to the sheet size required).

"It is a report people can use," says Mr. Eding. "It will help break down the wall between design and manufacturing and force the two areas to work together." It will undoubtedly become the standard guide for corporations that want to know where we are going in technology. Similarly, it will guide Pentagon and NASA budgeteers in their funding of research projects on materials.

● BACKGROUND—Since 1957, MAB has been trying to devise a means of forecasting problem areas in manufacturing methods in the aircraft, missile, and space fields. It decided to first identify types of future vehicles needed, then establish manufacturing techniques for the needed materials. To implement such a program, the Aircraft & Astronautics Applications Panel was set up in May, 1959, under the chairmanship of Dr. Elliott L. Katz. The 25 panel personnel came from 21 companies. Military representatives were also assigned.

● SCOPE—Descriptions of materials are written in terms of classes: Sheet metal, tubing, coatings, insulation, forgings and castings, nuclear materials, thermoelectric materials and electrode components, bearings, seals and flexible lines, composite membrane and filament materials, brazing alloys. All problems are considered under three designations: "O" indicates environments are not severe and solutions required are within present state of the art. "F" indicates solutions require an expanded effort. "S" indicates a severe problem. No solution is available, and more effort is needed.

Application tested! Proved!

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elevated temperature drawing (150,000 psi tensile)

ALLOY STEEL BARS

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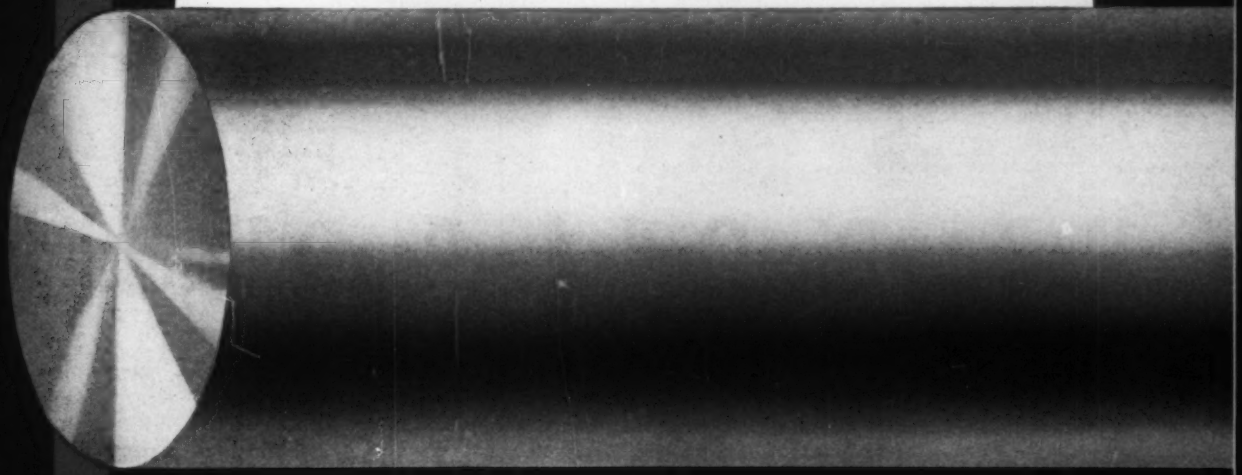

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(1) Heat treating problems, costs (and secondary operations) are eliminated. (2) "e.t.d." 150 machines better than heat treated in-the-bar alloy steels. (3) Tool life and finish are excellent. (4) No quench cracks or distortion from heat treatment. (5) "e.t.d." 150 has exceptional strength and hardness uniformity across the bar. (6) End cost of parts is greatly reduced.

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L. H. Shippee, director of purchasing

American Motors Corp. rescued its people power and cut its overhead $7 million in learning . . .

How to Dig Out of a Paper Landslide

THE PROGRAM helped AMC free salaried personnel for more important jobs. Results: In addition to the $7 million savings between 1957 and mid-1960, the number of salaried employees rose only 12.4 per cent while car production climbed 400 per cent.

Because automotive manufacturing operations are in Wisconsin and corporate headquarters are in Detroit, AMC's home purchasing office (originally two men and two secretaries) formerly maintained copies of all engineering blueprints and parts releases sent in from Kenosha, Wis., and Milwaukee plants. "We thought this would be a good way to keep up to date on production activities, but all it did was fill up half a dozen cabinets—and filing took up about half of the time of one of our girls," declares L. H. (Todd) Shippee, director of purchasing. With no budget for more help, that created a real time squeeze.

First step was to ask auto plant people to hold up sending prints and parts releases on everything but purchased items. That cut filing time in half. But purchasing also knew that central engineering maintained a complete file of all prints and releases. "We decided to cut out the whole business. Now, if we need a print or release, we can call engineering and get it in 5 minutes," says Mr. Shippee. The department saved more than 750 manhours a year.

• **Reports** — A copying machine stepped up efficiency in maintaining vender records and reports. Purchasing formerly kept a vender price list. It also maintained a quotation record card for each part. Whenever a vender's prices changed the entire pricing list had to be retyped.

Vender price lists were dropped. Changes are now recorded on the parts quote card which is reproduced by the copying machine instead of being retyped. "This piece of equipment has paid for itself several times over in the first year," declares Mr. Shippee.

• **Paper Pruners**—While each department was scrutinizing its overhead operations, general company paperwork was also overhauled. A forms and systems committee was established to screen all present and proposed forms and communication procedures on the bases of need and cost. As a result, some periodic operation reports that took a long time to compile and were of little use were eliminated at an estimated savings of more than 600 manhours a week. The summaries covered activities from vehicle manufacturing to office renovating.

Types of corporate letterheads have been reduced from 11 to 3, all of them using the same color, paper size, and stock. Manufacturing purchase order forms for productive and nonproductive items have been cut from four to one.

Paper supplies are constantly surveyed. When a form is depleted and a renewal request turned in, the forms and systems committee checks to see whether it's still useful—and whether it's being routed to the right people. Such surveillance helps curb a natural tendency to build up paperwork.

Output Value per Manhour and Hourly Wages

All Manufacturing Combined, 1955-59

Year	Production Value Added (Billions)	Labor Manhours (Billions)	Economic Output per Manhour	Employment Costs per Manhour	% Wages to Economic Output
1955	$133.21	25.909	$5.14	$2.05	39.88%
1956	143.71	26.099	5.51	2.15	39.02
1957	145.99	25.218	5.79	2.27	39.21
1958 (p) . . .	140.11	23.026	6.08	2.36	38.82
1959 (e) . . .	158.20	24.817	6.38	2.47	38.75
			Recent Average, 1955-59:		39.13

(p) Preliminary.
(e) Estimated from Bureau of Labor Statistics data.

Measure Output Value per Manhour

IT'S AN ACCURATE gage of your company's labor productivity, suggests Eddy-Rucker-Nickels Co., Cambridge, Mass., management consultants.

"In this day of union demands for pay increases in line with gains in productivity, few executives have figures showing the value of per manhour output in their own business. Wages or labor cost per manhour, they have. Value per manhour, they don't," says the company.

• **What It Is**—Production value is the conversion or fabrication value added to materials within the factory. It is determined by dividing the sales value of your products (minus the cost of raw materials and purchased parts) by your manhours of labor. Both direct and indirect labor are included in production manhours.

• **How Do You Compare?**—The economic output per manhour in metalworking industries (table at right) varies. Per manhour production value, the consultants advise, is the product of the combined efforts of labor, capital facilities, and management methods—not of labor alone. That's why company figures will differ from industry-wide averages.

Gains in economic output per manhour arise from better machinery, better methods, and better teamwork of personnel, in addition to price changes.

A comparison (top table) of all manufacturing hourly wages with hourly output values shows how consistently pay advances have matched productivity gains. The figures are from the U. S. Department of Commerce's *Survey of Manufactures*.

Economic Output per Manhour by Metalworking Industries

1957

Industry Group	Production Value per Manhour
Transportation Equipment	$6.40
Instruments, related products	6.37
Primary metal industries	6.35
Electrical machinery	6.01
Machinery, except electrical	6.00
Fabricated metal products	5.33
Miscellaneous manufactures	4.67

'Made in . . .' Image Counts Overseas

Many marketers contend that preconceived notions about a country and its people are reflected in consumer attitudes toward that country's products. A pilot study of such attitudes was recently made by Market Facts Roc International, a division of Market Facts Inc., Chicago. Interviews were conducted in six European countries and the U. S. Here are the product images of each country:

ENGLAND

Reliable, but old fashioned . . . Utilitarian . . . Expensive.

FRANCE

Graceful . . . Elegant . . . Charming . . . Exclusive and individual. Not soundly constructed or durable (except automobiles).

GERMANY

Soundly constructed . . . Reliable . . . Practical . . . Efficient . . . Inexpensive . . . Unaesthetic . . . Too massive.

HOLLAND

Sturdy . . . Reliable . . . Nontechnical . . . Ungainly.

ITALY

Colorful . . . Charming . . . Lively . . . Stylish . . . Individualistic . . . Inexpensive . . . Not reliable or durable.

SWEDEN

Good quality . . . Sound workmanship . . . Simple . . . Functional . . . Nonconventional.

U. S.

Accent on appearance. Poor workmanship and rapid wear, not because we can't produce better goods but because the U. S. production machine needs quick replacement if the wheels are to keep turning.

Jeep Buyers Get Seaway Savings

Willys Motors Inc., Toledo, Ohio, saved Jeep buyers in 11 foreign countries $153,720 in shipping costs this year. How?

It routed 5229 vehicles through the port of Toledo (via the St. Lawrence Seaway) instead of transshipping by rail or truck to New York. The number of vehicles represents a 45 per cent increase over 1959 shipments from Toledo. Average savings were $29.40 per unit, ranging from $8 a vehicle on shipments to India to $114 on those bound for Sweden.

Willys is one of many metalworking firms that have helped boost Toledo to fourth place among Great Lakes ports. The other three: Chicago, Detroit, and Duluth-Superior. Toledo handled 114,914 tons of overseas cargo in 1959. Overseas tonnage this year is estimated at 140,000 tons.

U. S. Appliance Exports Slip

A study on household appliance exports released by the Department of Commerce reveals that U. S. manufacturers are facing increasing competition in world markets. Reasons: Increased production in Western Europe and Japan and widespread import controls in foreign countries. Appliance exports equaled nearly $131.4 billion in 1959, about the same level as in '58 and '57 but $10 million below the '56 mark.

Electric refrigerators and freezers (farm and home) are the principal exports. Washing machines and cook stoves (except electric) are also in strong demand. The study reports overseas consumers show a marked preference for U. S. appliances because of styling and technical advancement. The most important factor: Producers must consider the suitability of the appliance to a market. Often a slight, easily made modification will increase sales. Credit terms are also an important consideration, the report emphasizes.

Aussies Renew 'Unfair Trade' Charge

The charge that Uncle Sam has obstructed Australia's trade opportunities will be renewed when the first U. S. trade mission visits that country early next year. Big gripe in the metalworking field: Rigid quotas on lead (metal) plus lead and zinc concentrates.

Continuous Casting Slated For Debut in India . . .

INDIA WILL HAVE a continuous casting steel plant within two years, says V. S. Kudva, the man behind the project.

During a recent visit to Pittsburgh's Mellon Institute, Mr. Kudva told STEEL of his plan to erect a 5 ton, electric arc furnace, casting equipment, and a bar mill at Mangalore, about 450 miles south of Bombay on India's west coast.

The facility will be known as the Canara Alloy Steel Div., Canara Workshops Ltd., of which Mr. Kudva is technical director. It will cost $1.2 million and employ about 100.

Billets of silicon manganese steel (3⅝ in. square) will be produced. At startup, the plant will have the capacity to convert billets into nearly 50 sizes of bars. Annual bar capacity: 9600 tons.

The bars will be shipped to Canara's automotive spring plant at Nagpur, 1100 miles away. Although the spring plant consumes only 5000 tons of bars a year, output may eventually be increased and finished goods exported.

• **Why the Development?**—"We were anxious to get away from our dependence on imported raw materials —alloy bars from Japan at $160 a ton or from the U. S. at $220," explains Mr. Kudva. "Although our country has an annual ingot capacity of 4 million tons (at Tata, Rourkela, Bhilai, Durgapur, and Burnpur), it's almost all carbon steel. None of it is suitable for our springs," he reports.

Canara's furnace will be built by Birlac-Efco (Melting) Ltd., Aldridge, Staffordshire, England. It will melt scrap (India has a surplus) for conversion into steel by a process developed by Concast A. G. Ltd., Zurich, Switzerland. A subcontractor, Distington Engineering Co., Worthington, England, will build and install the casting equipment. Another English firm, W. H. A. Robertson & Co. Ltd., will furnish the rolling mill.

Ultimately, Mr. Kudva hopes to install two, 10 ton furnaces. He obtained money for the project from two sources: The U. S. Development Loan Fund ($650,000) and a public stock offering (which was oversubscribed).

"There's no popular feeling against foreign investment in India," declares Mr. Kudva. "Our government welcomes foreign capital and knowhow. Import licenses are restricted out of concern for the foreign exchange situation. A tax of 45 per cent is levied on all business profits and 30 per cent on declared dividends," he explains.

London to Get U. S. Trade Center

The Department of Commerce will open its first, permanent overseas trade center in London next spring. It will display and sell products of U. S. private industry. Studies that indicate which U. S. goods have the best sales opportunities in the English market will be used as guides in setting up the displays.

East African Market Ripe for U. S. Goods

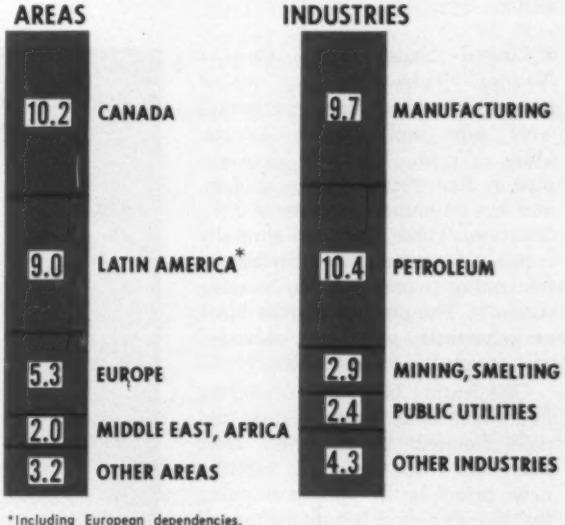
A U. S. trade mission, which has visited the principal business centers of Kenya, Uganda, and Tanganyika in East Africa, reports a keen interest in U. S. consumer goods and heavy industrial equipment. Some comments from mission members: "Recent removal of import restrictions presents U. S. exporters a golden opportunity to sell in this good and potentially great market" . . . "It is quite clear that this country . . . is ripe for major industrial expansion . . . has determined leadership" . . . "Excellent prospects for increasing U. S. exports of machinery, air conditioners, and industrial products" . . . "U. S. consumer goods have excellent acceptance in this rapidly expanding market."

TV Opportunities Rise in W. Germany

An immediate, substantial market for TV accessories, including converters, tuners, antennas—and possibly receiving sets and related goods—is opening up in West Germany, reports the Department of Commerce. It says there is a marked shortage of equipment. Wholesalers and importers in North Rhine-Westphalia are especially interested in U. S. products.

U. S. Direct Foreign Investments Totaled $29.7 Billion as of '59

(Billions of dollars; book value)



*Including European dependencies.
Source: Department of Commerce.

Foreign investment plans of U. S. firms (excluding petroleum) called for plant and equipment outlays of $1.3 billion in 1960, reports the National Industrial Conference Board, New York. While the investments were widespread, the major portion was scheduled to go to Canada, Germany, and the U. K.

Steelmakers Continue to Push Expansion Plans

THE LAG in demand for steel products has not put the freeze on expansion plans. Steelmakers are still investing millions of dollars in new facilities.

• **Nelsen Steel & Wire Co.**, Franklin Park, Ill., has completed a program which quadruples its production capacity and its line of cold finished bars. The line was formerly limited to bars up to 7/8 in. in diameter; it now includes rounds up to 4 in.

A large draw bench was constructed by the Vaughn Machinery Co., Cuyahoga Falls, Ohio. It produces bars to an accuracy of 0.002 in. in lengths up to 56 ft, draws at a speed of more than 350 fpm, processes 20 tons of steel an hour, and draws three bars at the same time. The bench is 146 ft long; its accessory equipment adds 299 ft.

Other phases of the expansion included the addition of 60,000 sq ft of floor space, construction of a 30,000 sq ft, covered craneway, and the addition of a double railroad siding.

• **United States Steel Corp.**—National Tube Div. has placed in operation its new, continuous weld pipe mill at its Lorain, Ohio, Works. The mill produces pipe in diameters of 1¼ in. to 4 in. and has an annual capacity of 237,000 tons. Those sizes are normally required for general construction, in fabricating work, and in making conduits. The product may be black or galvanized, plain end, threaded and coupled, or threaded only.

One feature is a stretch reducing mill which holds wall thickness and pipe diameter to extremely close tolerances. Another is the use of a new principle in roll positioning that allows almost instantaneous roll adjustments.

The corporation is constructing facilities at its Irvin Works, Dravosburg, Pa., for opened coil annealing of steel sheets. Initial production began this month and will reach full capacity by mid-1961, says A. T. Duff, general superintendent.

The installation will provide the porcelain enameling industry with high quality steel sheets adapted to intricate forming operations and one coat finishing. Applications are mainly in the manufacture of household appliances, bathtubs, sinks, and light reflectors.

Ups Wire Drawing Capacity

National-Standard Co., Niles, Mich., has expanded its capacity for producing stainless steel wire by 25 per cent. The increased capacity was made possible by new equipment installed at the company's Niles plant.

Dow Closes Diecasting Unit

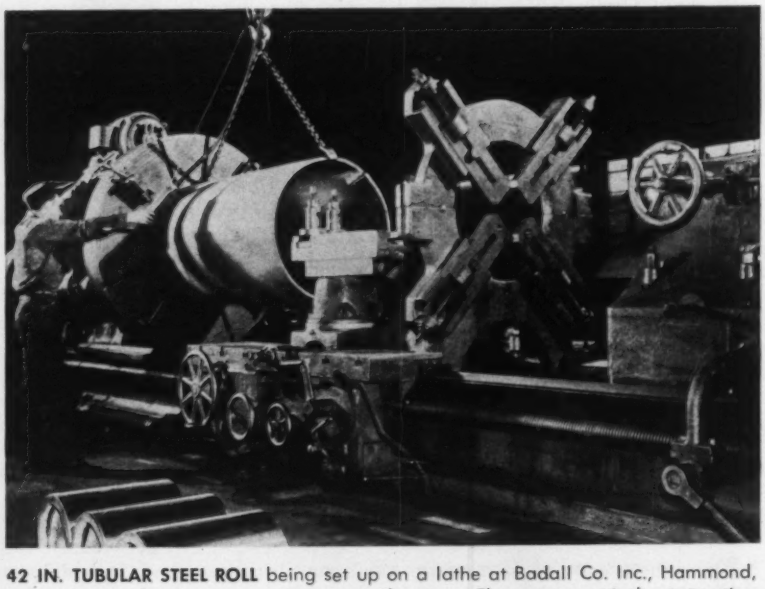
Dow Chemical Co., Midland, Mich., will close the Die Casting Dept. of its Bay City, Mich., plant. The Foundry and Fabrication Departments of the plant are not affected. The Bay City plant is operated by Dow Metal Products Co., a Dow division. Reason for the action: Dow will withdraw from competition with customers for its magnesium diecasting ingots. The opening of a $400,000 customer service laboratory in Midland in January will eliminate the need for development and pilot plant work by the Bay City diecasting department.

Simonds Saw Expands

Work has started on an estimated $1 million expansion of cold rolled steel production facilities at the Lockport, N. Y., plant of Simonds Saw & Steel Co., Fitchburg, Mass.

Ford Improves Foundry

Ford Motor Co., Dearborn, Mich., plans to install a new air pollution control system at its foundry in Cleveland. Emissions from the casting cleaning area of the foundry will be reduced by more than 95 per cent by a new dust collection system, says E. E. Harkess, foundry manager. The system will be built by American Wheelabrator Corp., Mishawaka, Ind. It will have a capacity of 650,000 cfm, or over 50 per cent more than that of the system it replaces.



42 IN. TUBULAR STEEL ROLL being set up on a lathe at Badall Co. Inc., Hammond, Ind., will be finished to customer specifications. The company is heat treating rolls of increasingly larger sizes as a result of development of its gas carburizing process. Badall is a subsidiary of Tool Steel Gear & Pinion Co., Cincinnati

Expands Service Centers

Universal-Cyclops Steel Corp., Bridgeville, Pa., has expanded its specialty steel service center facilities. The program includes an enlarged and modernized facility at Bridgeville, Pa., and new or enlarged facilities at Titusville, Pa., Worcester, Mass., Chicago, Cleveland, Detroit, and New York. The company produces stainless steels, tool steels, high temperature and refractory metals.

Viking Broadens Research

Viking Wire Co. Inc., Danbury, Conn., is expanding its research laboratory. It will be equipped for the research and development of magnet wire products.

Buys Drayer-Hanson Div.

Hi-Press Air Conditioning of America Inc., New York, purchased the Drayer-Hanson Div. of the Crane Co., Los Angeles, producer of air conditioning components and a line of refrigeration, heating, and heat transfer equipment.

NEW ADDRESSES

Kaiser Refractories & Chemicals Div., Kaiser Aluminum & Chemical Corp., Oakland, Calif., moved its Toledo, Ohio, warehouse and sales offices to 2031 Detroit Ave., that city.

Crescent Metal Products Inc. moved to 12711 Taft Ave., Cleveland 8, Ohio.

Durkee-Atwood Co., Minneapolis, moved its Eastern offices and warehouse to 590 Belleville Turnpike, Kearny, N. J.

Selas Corp. of America, Dresher, Pa., moved its Cleveland district headquarters to 6025 Mayfield Rd., Cleveland 24, Ohio.

Cornell - Dubilier Electronics Div., Federal Pacific Electric Co., transferred its corporate headquarters to Newark, N. J. Some manufacturing operations will remain in South Plainfield, N. J.

Singleton Co. moved into its new plant at 11770 Berea Rd., Cleveland, Ohio.

NEW OFFICES

Tennessee Coal & Iron Div., U. S. Steel Corp., officially opened its new district sales office at 1375 Peachtree Bldg., Atlanta, Ga. C. P. Irwin is district sales manager.

Seaporcel Metals Inc., Long Island City, N. Y., opened an office at 3110 Maple Dr. N.E., Atlanta, Ga. Don Levine heads the new office. The firm makes architectural and marine porcelain products.

Raytheon Co., Waltham, Mass., opened a regional commercial office at 3110 Maple Dr. N.E., Atlanta, Ga.

Scientific & Process Instruments Div., Beckman Instruments Inc., opened a sales office at 12 Norfolk St., Cambridge 39, Mass.

W. F. & John Barnes Co., Rockford, Ill., opened a branch office at 18610 W. Eight Mile Rd., Southfield, Mich. C. S. Johns is district manager.

CONSOLIDATIONS

SKF Industries Inc., Philadelphia, acquired **Nice Ball Bearing Co.**, that city, a division of Channing Corp.

Bendix Corp., Detroit, is purchasing **Micrometrical Mfg. Co.**, Ann Arbor, Mich., manufacturer of equipment used to measure the surface finish of materials. F. A. Zander is general manager of the new subsidiary of Bendix.

Fisher Governor Co., Marshalltown, Iowa, producer of pneumatic and electronic automatic control equipment, acquired **E. Herbert Vickery Co.**, Oakland, Calif., manufacturer of ball type valves.

Union Twist Drill Co., Athol, Mass., is acquiring **Reed Rolled Thread Die Co.**, Holden, Mass. Bradford Reed will continue as president of the subsidiary company.

Northern Indiana Steel Supply Co. Inc., Michigan City, Ind., purchased **Elkhart Metals Co.**, Elkhart, Ind., and will operate the property as Elkhart Metals Inc.

Sun Chemical Corp., Long Island City, N. Y., acquired **Carbro Chemical Co.**, Pawtucket, R. I., manufacturer of electrical wire coatings. The new property will be integrated into Sun Chemical's Chemical Coatings Div.

ASSOCIATIONS

National Association of Corrosion Engineers, Houston, elected these officers: President, E. C. Greco, United Gas Corp., Shreveport, La.; vice president, Rolland McFarland, Hills-McCanna Co., Chicago; and treasurer, C. G. Gribble Jr., Metal Goods Corp., Houston.

Plumbing Brass Institute, Pittsburgh, elected these officers: President, M. W. Peterman, Milwaukee Faucets Inc., Milwaukee; first vice president, F. V. Cowing, Repcal Brass Mfg. Co., Jonesboro, Ark.; second vice president, C. W. Rush Jr., Beaton & Corbin Mfg. Co., Southington, Conn.; and treasurer, N. A. Lougee, Chicago Faucet Co., Chicago. Hanson & Shea Inc., Pittsburgh, will continue as executive secretary.

American Hot Dip Galvanizers Association Inc. appointed John R. Daesen as technical director. The association has moved its headquarters to 5225 Manning Place N.W., Washington 16, D. C. The office is in charge of Charles E. Perry who has succeeded the retiring secretary-treasurer, Stuart J. Swensson.

Caster & Floor Truck Manufacturers Association, Chicago, elected these officers: President, E. M. Heffernan, Jarvis & Jarvis Inc., Palmer, Mass.; vice president, D. F. Adams, Colson Corp., Chicago; and treasurer, D. B. Anderson, Nagel-Chase Mfg. Co., Chicago.

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excellent accuracy, duplicating to less than .001". . . clean front and ease of conversion to regular or Copymatic operation are outstanding . . . removing 15 to 30% more metal than our best (lathes) — twice that of some.

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82% time saved . . .

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Helps make deliveries and money..

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$2000 annual saving . . .

ELECTRONICS MANUFACTURER

Production increased 200%

Shown is 90° COPYMATIC Lathe with 4-Way Power Rapid Traverse, (optional extra). 45° COPYMATIC and Powershift Preselector headstock also available.

HOW TO JUSTIFY YOUR LATHE REPLACEMENT

LOOK AT LODGE & SHIPLEY FIRST!

More production at lower cost is the answer to constant upward pressure on prices. Savings proved in Lodge & Shipley case histories* show the wisdom of investigating *and* buying a Lodge & Shipley POWERTURN Lathe as a profitable replacement.

Production requirements change. The lathe purchased just a short time ago may not be adequate . . . judged by today's production, accuracy and economic standards. Details in Sweet's Machine Tool File; contact local representative through Yellow Pages or write direct for case histories and Bulletin No. L-103:

The Lodge & Shipley Co., 3070 Colerain Avenue, Cincinnati 25, Ohio.

**Names and details on request.*

Lodge & Shipley

Our objective, says W. E. Sehn, is to give the customer a little more than he expects. He tells how . . .

Fisher Body Adopts Reliability

MORE COMPLEX designs and manufacturing methods plus shorter tooling cycles have increased the need for reliability. More than half of the General Motors Corp. divisions have established such programs. Fisher Body is one of the latest. The approach of William E. Sehn, director of the program, is interesting because of the organization's special requirements: It must supply 108 different body styles to five car divisions. (More than 34,000 separate blueprints are needed to get the bodies into production.)

Mr. Sehn is convinced that reliability starts early in design. He asserts: "Our aim is to give the buyer a better car than he is expecting to get when he walks into a showroom. This kind of dependability is created during design and engineering phases. No amount of care or watchfulness during the building stage can cure any unreliability designed into a body."

• **Close Check**—A ten man staff keeps tabs on each phase of a body program — from styling through production and, finally, into the field. Last year, the group (which evolved from the product evaluation department) initiated 305 reliability actions on GM's car bodies. Says Mr. Sehn: "Each department in our division is a specialist, and it knows what it must do to build a good body. But because we have the responsibility of auditing all these different areas, we often can see some aspects of the job that individual sections aren't aware of. Then we can act as a sounding board and liaison group to suggest and initiate changes, so we won't keep making the same mistakes in the final product."

• **Six Keys**—To put reliability to work, Mr. Sehn has keyed his group's responsibilities to six action words. "We *investigate* current and future designs through all phases of development and into production. The information we collect is *evaluated* to see where and how we should improve reliability. We then can *initiate* action through the department or section that can make the necessary changes. This work is *co-ordinated* through our reliability co-ordination staff. Sometimes, we make *innovations* in present techniques or designs. An important job is to establish *communication* lines so information can flow smoothly."

Mr. Sehn's group scrutinizes new product styling, development, and design before they are accepted for production. It also checks engineering, tooling fabrication, and assembly of current bodies. It audits field service complaints and warranty costs and watches vender and divisional quality. It checks to see how closely bodies are built to original specifications.

• **Organization**—Unlike many reliability staffs, Mr. Sehn's group is separated from Fisher Body's quality control section. It reports through the engineering section as one of four major activities. (The others are product, tool, and die engineering.) Each staff engineer has the responsibility for reliability in a design area. (They include body-in-white, hardware and hard trim, soft trim, sealing and electrical, anticorrosion and paint, production engineering, die engineer-

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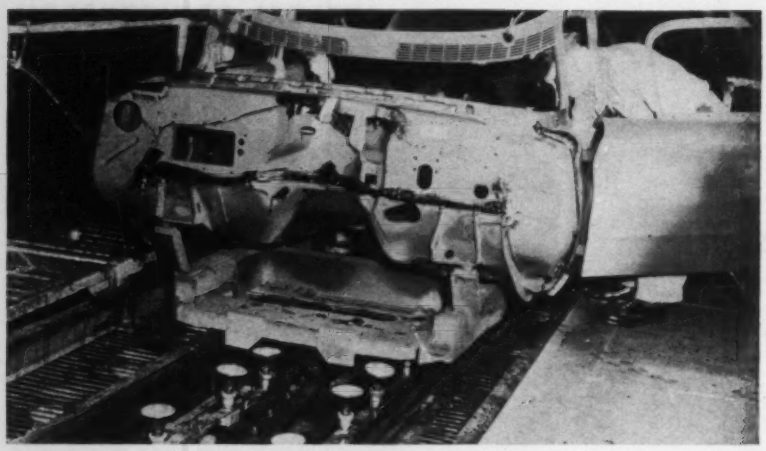
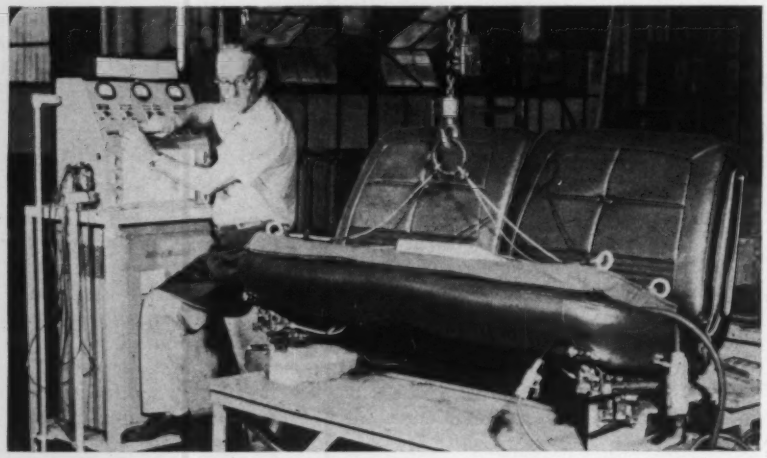


Quality control inspectors used to rely on a water test to check for sealer cracks and pinholes in GM car bodies. Now each body in white also passes over this battery of lights which quickly reveal defects that can be repaired on the line



Each six-way power seat is tested for two cycles under 450 lb of weight on this offline test stand. Previously, sample seat mechanisms were laboratory tested before production

ing, manufacturing, field service. Test co-ordination and statistics will be added.)

Probably the most effective part of the setup is the co-ordination staff, which is made up of members from body, production, and die engineering activities, as well as manufacturing, quality, and finance personnel. The group meets often to review current and proposed reliability action. Co-operation is good because each department and section within Fisher Body is represented. "This means the reliability group doesn't have to act like ministers without portfolios," says Mr. Sehn.

A reliability policy board composed of top division management is on call to determine basic policy as well as to offer advice and iron out conflicts.

• **Education**—The most important job ahead, thinks Mr. Sehn, is to educate everyone (from hourly workers on up through section and department heads) about the need for reliability. "Top management already knows its value. Now we have to sell it to the rest of the organization and to our suppliers. We would like them to recognize the need for reliability as we do," he says.

Exhaust Notes . . .

• Ford says it has a two month order backlog on Thunderbirds. November sales hit a record 8100 units, reports L. A. Iacocca, Ford Div. general manager and newly elected company vice president.

• Air-conditioning units for General Motors' buses show a rapid rise, says GMC Truck & Coach Div., Pontiac, Mich. More than 35 per cent of the division's 3500 bus shipments in the last 15 months have been equipped with coolers.

• Continued high sales of imported Simca cars has spurred Chrysler Corp. to expand its exclusive dealerships (only 77 now) for this car in the U. S. Lynn A. Townsend, administrative vice president, says the car now is in third place among imported vehicles, but this is true only for September. Latest registration figures (through September) show 13,860 sales this year against 28,765 in '59. On a year to date basis it ranks seventh.

• White Motor Co.'s production schedules will be stepped up 15 to 20 per cent in January, says J. N. Bauman, president. Starting production on White's new line of compact trucks plus a backlog on other models is the reason for the production increase.

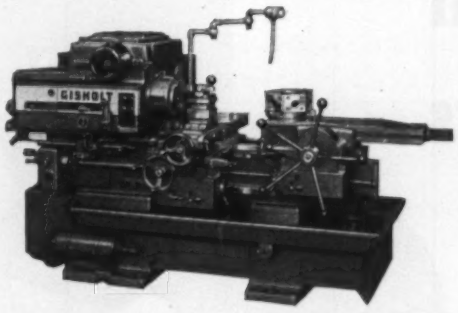
U. S. Auto Output

Passenger Only

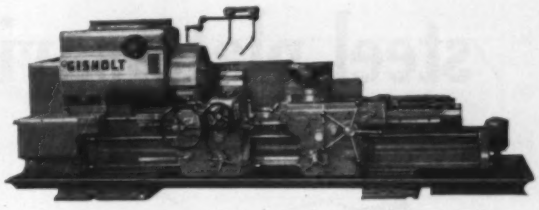
	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
August	305,527	239,152
September	407,685	258,151
October	617,816	507,527
November	597,132	254,527
11 Mo. Totals	6,172,115	5,098,779
December		494,931
Total		5,593,707

Week Ended	1960	1959
Nov. 19	149,753	68,476
Nov. 26	111,091	46,740
Dec. 3	135,348	55,337
Dec. 10	135,328	86,566
Dec. 17	131,289†	152,449
Dec. 24	130,000*	103,219

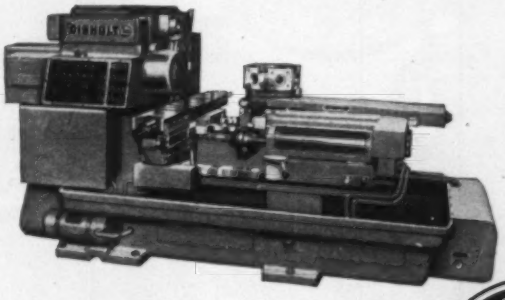
Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.



Gisholt MASTERLINE Universal Ram Type Turret Lathe

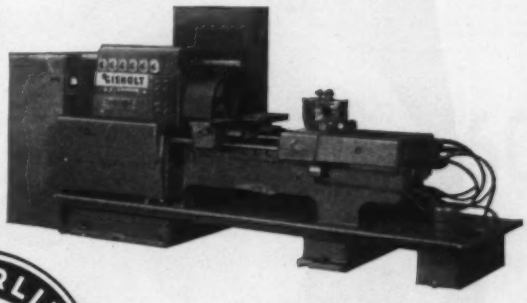


Gisholt MASTERLINE Saddle Type Turret Lathe

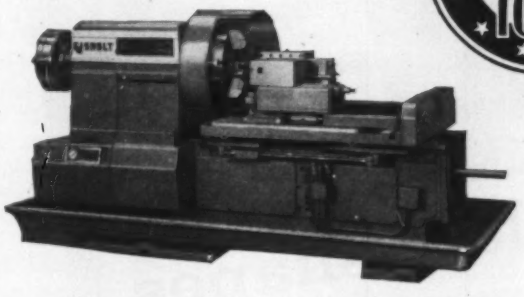


Gisholt MASTERLINE AR (Automatic Ram) Turret Lathe

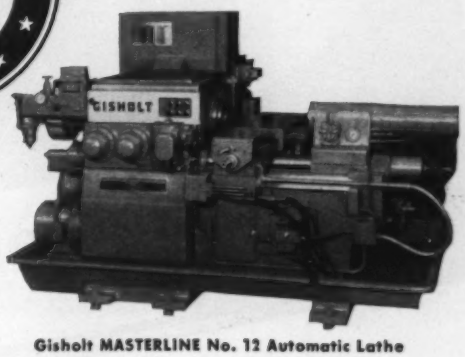
MASTERLINE GISHOLT SINCE 1887



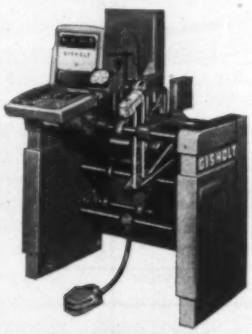
Gisholt MASTERLINE Fastermatic with FeeDial Control



Gisholt MASTERLINE Simplimatic Automatic Lathe



Gisholt MASTERLINE No. 12 Automatic Lathe



Gisholt MASTERLINE Balancing Machines

Gisholt MASTERLINE Superfinishing Machines

The illustrations on this page show the eight basic lines built by the Gisholt Machine Company. A General Catalog, Form 1126-N with complete specifications and basic information on the Gisholt MASTERLINE Machines, is available on request. Direct your inquiry to:

GISHOLT MACHINE COMPANY

1217 East Washington Ave., Madison 10, Wis.

For some pointers on steel plate savings...

This illustrated 16-page booklet outlines the Steel Plate Shapes Service available from Lukens Steel Company; describes scores of typical shapes produced on Lukens facilities; points out the cost-cutting features of this "pre"-fabricating service: *savings* on steel freight costs, scrap handling expense, shop spoilage, capital investment. For your free copy, simply fill in and mail this coupon.

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Fabrication Building, Dept. B-120
Coatesville, Pa.

Please send me your free booklet on Steel Plate Shapes.

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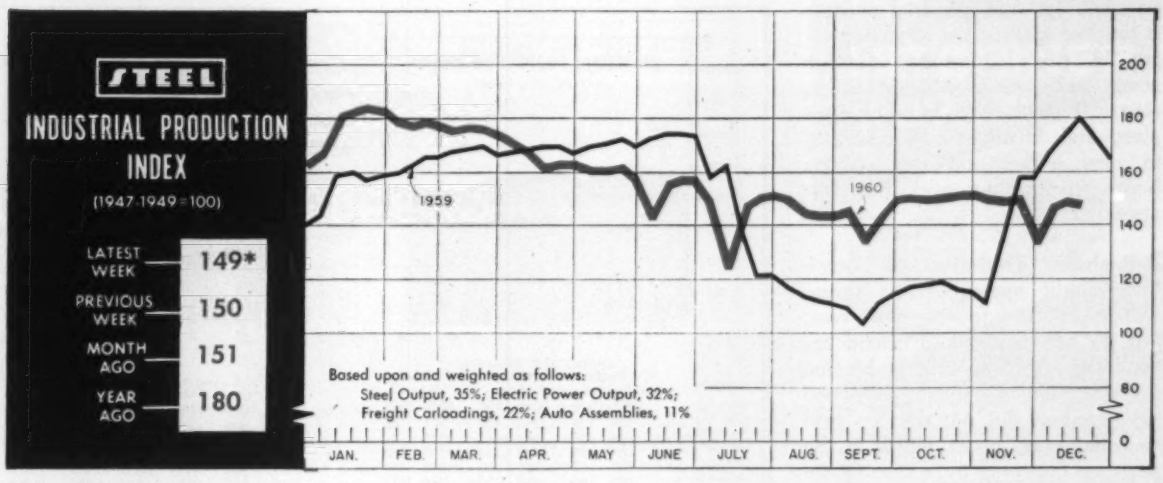
COMPANY _____ TITLE _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____



*Week ended Dec. 17.

Production Index Sets Record in '60

MANY indicators will set records this year despite the generally disappointing level of business. STEEL's industrial production index (based on electrical, steel, and auto output and freight carloadings) will be the highest in history. It should equal about 158.5, 9.5 points above last year's mark and 5.5 points over the record (in 1957).

The Federal Reserve Board's index of industrial production will also set a record (see table and graph, Page 48). Gross national product will exceed last year's $482 billion mark. It's expected to hit $503 billion, says the Cleveland Trust Co., Cleveland. If GNP is adjusted for price changes, its increase will be close to 3 per cent. It was at a seasonally adjusted rate of well over $500 billion through the third quarter.

• **Employment Is Paradox**—Total employment will also be at a new high this year, although metalworking hasn't kept pace with the national level (see table and graph, Page 48). At the same time, unemployment has been higher than normal because productive demands on the economy haven't expanded as fast as the labor force. Example: More people were employed in November than ever before in that month. Yet joblessness during the month was the highest in 20 years.

Despite the over-all records established this year, it's going to be difficult to find many individual records in metalworking. Some segments will have a good year, but few will chalk up records.

• **First Half Did It**—The buildup in the first half was sufficient to counterbalance the downtrend in the last half when the minus factors began to outweigh the plusses. The output of soft goods has held steady; retail sales have been good (though yule spending may not

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,335[1]	1,387	2,641
Electric Power Distributed (million kw-hr)	14,700[1]	14,604	14,150
Bituminous Coal Output (1000 tons)	7,310[1]	6,390	9,125
Crude Oil Production (daily avg—1000 bbl)	7,100[1]	7,152	7,139
Construction Volume (*ENR*—millions)	$300.9	$446.1	$294.8
Auto, Truck Output, U. S., Canada (*Ward's*)	162,242[1]	165,971	182,697
TRADE			
Freight Carloadings (1000 Cars)	500[1]	518	615
Intercity Truck Tonnage (changes from year ago)	−5.1%	−5.5%	+7.2%
Business Failures (Dun & Bradstreet)	360	290	248
Currency in Circulation (millions)[3]	$33,038	$32,722	$32,798
Dept. Store Sales (changes from year ago)[3]	−1%	−7%	+2%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$25,190	$27,287	$28,358
Federal Gross Debt (billions)	$290.3	$290.4	$292.2
Bond Volume, NYSE (millions)	$29.0	$31.0	$33.1
Stocks Sales, NYSE (thousands of shares)	17,846	18,315	16,094
Loans and Investments (billions)[4]	$107.4	$107.3	$105.5
U. S. Govt. Obligations Held (billions)[4]	$29.4	$29.3	$28.0
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	216.2	221.5	229.5
All Commodities[7]	119.5[1]	119.5	118.9
Commodities Other than Farm & Foods[7]	127.9[1]	127.9	128.5

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

top record '59); exports are up significantly; and personal income is up; but a slack situation is present in steel and other durable goods, such as metal fabricating, electrical machinery, building supplies, and furniture. A softening in new orders and the average hours worked per week has also appeared.

● **Realistic Optimism** — There's little doubt but what the slump will continue into the new year, but it's not expected to extend beyond the middle months or become drastic. The comeback from the '58 recession did not develop into an inflationary boom, which in the past was followed by a bust. Price levels have been maintained on an even keel, and there has been no speculative urge to build up inventories and capital equipment in anticipation of higher prices.

So businessmen seem to be entering 1961 with confidence—quite a change from the bubblelike enthusiasm in evidence at this time last year. While they realize that business will continue its present gait into 1961, they are not haunted by visions of a depression. Such stability is expected to generate an upturn next year. Even though it won't be boomlike, it will be sound.

Stocks Good Indicator

For years, business analysts have watched the stock market, especially industrials, for clues to the future health of the general economy. But the general bull market has persisted since 1949, so many have tended to discount the market's value as a lead indicator.

But an analysis of the market since 1947 seems to confirm its lead tendencies. Because the swings in industrial stock indexes are generally less severe than those of the Federal Reserve Board's industrial production index, they require more careful attention and corroboration than some of the other ten leading indicators.

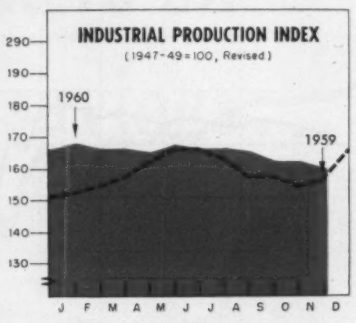
● **Four Month Lead**—For example, prior to the 1947-49 recession, Standard & Poor's index of 425 industrial stocks softened four months prior to the dip in the FRB index. But the decline was so gradual that it was hardly recognizable for the first six or eight months. The trend line began an upsweep in July, 1949, four months before the production line perked up.

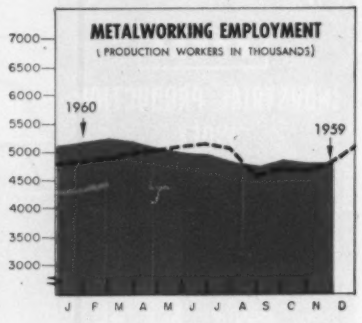
In 1953, industrial stocks slipped four months ahead of the FRB index. But they strengthened three months after the recession set in and began a steep climb that lasted nearly three years. The recession trend wasn't reversed until 13 months after the stock market boomed.

In mid-1956, the market gave every indication of an impending general recession. But it strengthened and climbed to a new peak before again taking a plunge in August, 1957. The FRB index started its 1957-58 down cycle one month later. (The false alarm may have been a delayed reaction to the steel strike of 1956.) Stocks turned up in January, 1958, four months ahead of the general upturn.

● **'61 Trend Cheering** — Stocks started down last January, seven months ahead of the start of the current decline in the FRB index. The November average was up. A further rise this month, supported by similar signs in other leading indicators, could be a prelude to a general strengthening in the economy around mid-1961.

THE BUSINESS TREND





(Seasonally adjusted)

	Total Production		Total Mfg.		Durables Mfg.	
	1960	1959	1960	1959	1960	1959
Jan.	168	152	168	150	181	156
Feb.	166	155	166	153	178	160
Mar.	166	157	165	156	175	165
Apr.	165	162	164	161	172	170
May	167	166	166	165	174	177
June	166	166	165	166	171	178
July	166	163	165	163	172	171
Aug.	165	157	163	157	169	159
Sept.	162	157	161	156	166	157
Oct.	162	154	160	153	165	155
Nov.	159*	155	157*	154	161*	155
Dec.	...	165	...	164	...	174
Avg	...	159	...	158	...	164

Federal Reserve Board. *Preliminary.
Charts copyright, 1960, STEEL.

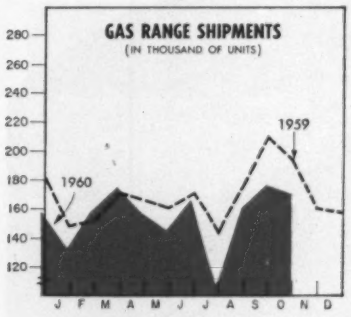
1959	Prim. Mtls.	Fab. Prod.	Mach-inery	Elec. Mchy.	Trans. Equip.
Nov.	975	800	1,136	882	1,026
Dec.	1,036	841	1,166	892	1,172
1960					
Jan.	1,048	857	1,179	892	1,239
Feb.	1,052	863	1,191	890	1,245
Mar.	1,043	954	1,186	879	1,221
Apr.	1,020	837	1,176	860	1,187
May	993	836	1,159	855	1,174
June	970	840	1,154	859	1,127
July	924	817	1,130	850	1,105
Aug.	910	819	1,112	861	1,036
Sept.	905	835	1,104	877	1,135
Oct.	894	833	1,086	846	1,149
Nov.	882	819	1,084	863	1,154

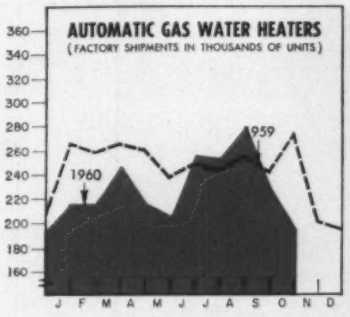
U. S. Bureau of Labor Statistics.

Electronics Up 6% in '60

Factory sales of the electronics industry will hit a record $9.75 billion this year, a 6 per cent boost over the 1959 mark, says L. Berkley Davis, president, Electronic Industries Association, Washington. "This means the industry will have set a new sales peak in every year of the last decade," he points out.

"We believe business will advance another 6 per cent in 1961 to total $10.3 billion," predicts Mr. Davis. "While the short term outlook is somewhat obscured by uncertainties over the state of the national economy, we can expect total electronics sales to be strongly supported by increases in defense requirements and steady expansion of the industrial electronics market," he continues. "The prospect for consumer goods sales will be substantially brightened if the Federal Communications Commission, as expected, soon estab-





	Shipments—Units 1960	1959	1958
Jan. ..	133,500	148,700	128,200
Feb. ..	159,500	152,400	134,200
Mar. ..	175,000	171,300	149,300
Apr. ..	156,600	165,800	148,200
May ..	145,600	160,400	147,200
June ..	166,800	171,000	155,900
July ..	105,900	143,800	129,100
Aug. ..	160,800	176,100	157,700
Sept. ..	176,800	210,300	182,300
Oct. ..	169,800*	194,500	212,200
Nov. ..	.....	159,600	171,200
Dec. ..	.....	156,900	181,000
Totals .	.....	2,010,800	1,896,500

*Preliminary.
Gas Appliance Mfrs. Assn.

	Shipments—Units 1960	1959	1958
Jan. ..	215,500	266,200	235,400
Feb. ..	214,800	259,700	216,300
Mar. ..	247,300	265,900	221,600
Apr. ..	216,200	261,300	221,900
May ..	205,500	239,300	210,000
June ..	256,000	250,000	231,000
July ..	254,100	245,100	221,400
Aug. ..	279,400	256,100	215,500
Sept. ..	226,600	243,800	230,000
Oct. ..	192,900*	274,200	265,900
Nov. ..	.....	199,100	197,100
Dec. ..	.....	192,900	207,300
Totals .	.....	2,953,600	2,673,400

*Preliminary.
Gas Appliance Mfrs. Assn.

lishes transmission standards for FM, stereo, radio broadcasting."

Mr. Davis concludes domestic competition will be chiefly in the technological area and "only manufacturers who keep abreast of advancements will survive."

Appliance Makers Bullish

In a survey of 22 appliance industry leaders, 15 say they expect sales increases in 1961 ranging from 2 to 5 per cent on appliances with high market saturation and as much as 25 per cent on growth items such as central air conditioning and dishwashers, reports Sol Goldin, Whirlpool Corp., and president, board of trustees, Institute of Appliance Manufacturers, Washington. Not one of the respondents sees a decline in appliance sales next year. Seven anticipate a sidewise movement in unit sales with a slight rise in dollar sales because of upgrading. The group concluded: Rising costs make early increases in appliance prices almost a certainty.

The Gas Appliance Manufacturers Association, New York, sees these gains and losses in unit sales of gas appliances and equipment (1961 vs. 1960):

Domestic gas ranges ...	+ 1.8%
Free standing	− 0.4
Built-in	+10.7
Automatic water heaters	+ 1.5
Central heating equipment	+ 6.2
Warm air furnaces ...	+ 7.5
Boilers	+ 4.5
Conversion burners ..	− 0.4
Vented recessed wall heaters	− 1.0
Floor furnaces	− 4.9
Direct heating equipment	+ 2.3
Incinerators	+ 9.2
Unit heaters	+ 2.1
Duct furnaces	+10.3

Trends Fore and Aft

The production pattern of the material handling equipment industry in the early months of 1961 will be close to what it was in 1960, reports the Department of Commerce. Bookings in the first six months will be comparable to the 1960 level. But production in the last half is expected to be 10 per cent higher than it was in the last half of this year. Conclusion: As a whole, 1961 will be slightly better than 1960.

"the HITCHINER way..."

...and non-machinable super alloys in INVESTMENT CASTING

These spray nozzles for highway striping paint sprayers were formerly machined out of cold rolled bar stock. When ordinary paint was used, these nozzles functioned satisfactorily. However, when ground glass was added to the paint for reflecting purposes excessive wear caused frequent replacement.

By "the HITCHINER way . . .", we were able to engineer the manufacture of this part by investment casting in a non-machinable type alloy exhibiting a very high degree of resistance to both wear and corrosion.

This change of alloy, which eliminated the need for frequent nozzle replacement, was made possible through investment casting because the required close dimensional tolerances and detail could be cast to size.

Through the wide freedom of choice in alloy, as well as through flexibility in design and the elimination of expensive machining operations, investment casting may possibly solve your metal parts manufacturing problems. Send us your sample or blueprint and find out with a Hitchiner "engineered quotation" — no obligation.

NO LIMITATIONS. From miniature ball bearing races to 20" Steam Turbine Impellers, "the Hitchiner way . . ." with investment castings can help you.

Send for our latest revised brochure and find out for yourself. It's free.

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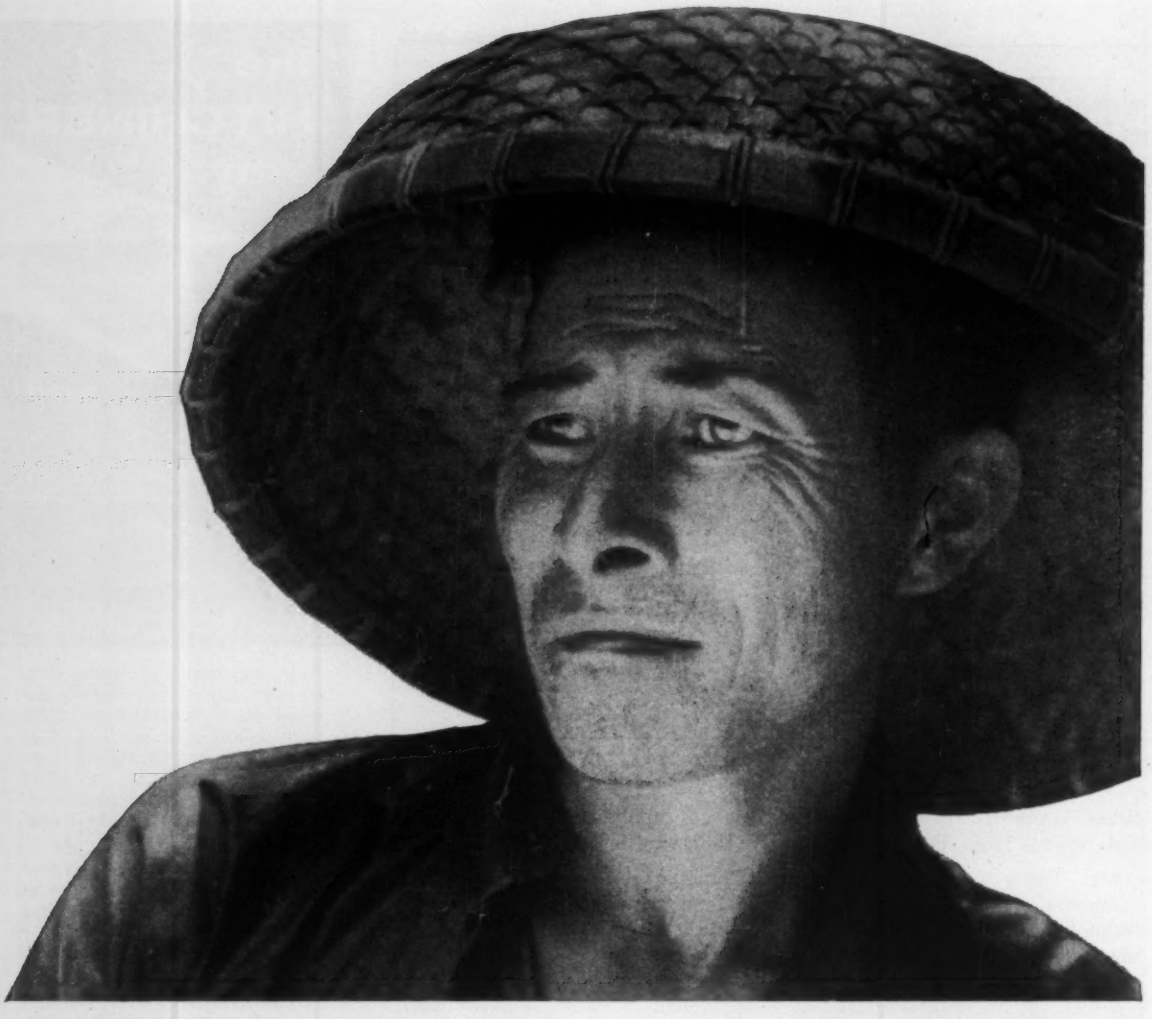
MILFORD 29, NEW HAMPSHIRE
Coast to Coast Engineering Representatives



Can you understand this man's hunger for Tools?

Without them he's useless—a burden to himself and the earth. ■ With tools in his hands—a spade, a hoe, a trowel, a rake—he could raise food enough for his own family and perhaps other hungry villagers. ■ But for this man and countless others like him in Greece, in India, in Latin America and other desperately poor areas—the simplest steel implements are beyond reach. They cost too much. So millions of acres are barely scratched...with forked sticks or wooden ploughs...and two-thirds of the world's people still go to sleep hungry. ■ Will you help them till the fertile earth...through CARE? Wherever possible, CARE food distribution is coupled with a tools-for training program that enables men and women to become self-supporting. The need was never greater, the rewards never richer. ■ *Will you buy an extra tool*—to put into hands hungry for work, food, and dignity? ■ Send dollars to CARE, New York 16.

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COOPERATIVE FOR AMERICAN RELIEF EVERYWHERE, INC.
660 FIRST AVE.
NEW YORK 16, N.Y.

Here is $_____ for food ☐ tools ☐
books ☐ medicine ☐ CARE's choice ☐

(PLEASE MAKE CHECKS PAYABLE TO CARE, INC.)

NAME_____

ADDRESS_____

_____

(Space donated by this publication)

RAYMOND G. NORDSTROM
Hevi-Duty exec. v. p.

WILLIAM J. FATH
H-P-M dir.-mfg.

STANLEY B. WHITE
Kaiser Alum. mfg. v. p.

THOMAS G. LANPHIER JR.
Fairbanks, Morse president

Raymond G. Nordstrom fills the new post of executive vice president, **Hevi-Duty Electric Co.**, Milwaukee, division of Basic Products Corp. His primary responsibilities are in marketing. He was executive vice president-general manager of Reflectal Corp., Chicago, subsidiary of Borg-Warner Corp.

William J. Fath was promoted to director of manufacturing, **Hydraulic Press Mfg. Co.**, division of Koehring Co., Mt. Gilead, Ohio. He was works manager.

General Electric Co. named **Walter N. Shambach** manager of marketing and product development, Heaters & Devices Section, Industrial Heating Dept., Shelbyville, Ind.; and made **Arthur G. Woodside** marketing manager, Instrument Dept., West Lynn, Mass.

United States Steel Corp., Pittsburgh, appointed **Norman C. Michels** vice president-facility planning and appropriations, effective Jan. 1. He succeeds **J. D. Rollins,** recently named president of American Bridge Div. Mr. Michels was vice president-engineering, Tennessee Coal & Iron Div., Birmingham. **Howard N. Hubbard** was made general superintendent of National Tube Div.'s Fairless Works, Fairless Hills, Pa. He succeeds **Alvin J. Scheel** who moves Jan. 1 to the division's Lorain, Ohio, Works as assistant general superintendent. **John P. Ely** was made assistant general superintendent of the National Works, McKeesport, Pa., National Tube Div., succeeding Mr. Hubbard.

Stanley B. White was made vice president - manufacturing (aluminum) for **Kaiser Aluminum & Chemical Corp.**, Oakland, Calif. He was vice president-general manager of the Industrial Div.

William S. Barnum was made assistant manger-tubular sales for **Kaiser Steel Corp.** at Oakland, Calif. Former assistant manager-sheet and strip sales, he succeeds **Jack H. Webber,** recently named manager of Kaiser's Mid-Continent sales district.

Chester Devenow was elected president of **Globe-Wernicke Industries Inc.**, Toledo, Ohio, effective Jan. 1. He succeeds **William D. Hahn,** elected chairman. **LeRoy Eastman** resigned as chairman but continues as chairman of the executive committees for the company and subsidiaries. **Joseph F. Howard** recently retired as executive vice president and **Carl Eversman** was elected vice president-general manager, Stamping Div.

Thomas G. Lanphier Jr. was elected president of **Fairbanks, Morse & Co.**, Chicago. He became associated with Fairbanks Whitney Corp., parent firm, in September as vice president-planning, and continues as a vice president of the parent company. He previously served for ten years as vice president and assistant to the president of Convair Div., General Dynamics Corp., responsible for product planning.

Arley J. Ball was made Eastern regional sales manager (New York) of **Hewitt-Robins Inc.**, succeeding **Norman M. Godfrey,** recently named manager of operations, Robins Conveyors Div. Mr. Ball was Cleveland district sales manager.

David H. Stieber was appointed director of sales and engineering, automotive and railway products, **A. O. Smith Corp.**, Milwaukee. **Peter S. Blake** was made assistant manager - manufacturing for the group (a new post), and is suc-

NORMAN C. MICHELS HOWARD N. HUBBARD JOHN P. ELY
U. S. Steel, National Tube Div. appointments

CHARLES J. LAWSON JR.
heads Hancock Telecontrol

DONALD E. THAL
Link-Belt Internat. Div. mgr.

JOHN R. IKNER
Chevrolet foundry mgr.

CARL J. SIEBERT JR.
Aronson gen. sales mgr.

ceeded as manager-quality control by **W. P. Koth.**

Charles J. Lawson Jr. heads **Hancock Telecontrol Corp.**, a new company, as chief executive officer. Hancock Telecontrol acquired the Telecontrol Div. of Hancock Industries Inc., Jackson, Mich. Mr. Lawson was director of manufacturing services, International Business Machines Corp., New York. **Robert W. Hancock** is chairman of the new firm. He continues as president of Hancock Industries Inc.

Orville C. Christensen joined **Minneapolis Electric Steel Castings Co.**, Minneapolis. He will be responsible for sales of heat and corrosion resistant alloy castings. He previously held engineering posts at Minnesota Mining & Mfg. Co., and was in industrial sales with Power Process Equipment Co.

John W. Eder Jr. was appointed general sales manager, **Chicago Eye Shield Co.**, Chicago. He was assistant sales manager.

Donald E. Thal was appointed general manager of the new International Div. of **Link-Belt Co.** He has headquarters in Chicago. Mr. Thal was general manager, Pacific Central Div., San Francisco.

John R. Ikner was made plant manager of General Motors Corp.'s **Chevrolet Motor Div's** gray iron foundry at Saginaw, Mich., to succeed the late **William C. Schartow. George H. Johnson** succeeds Mr. Ikner as general superintendent of production at the foundry. Mr. Johnson was general superintendent-production at Chevrolet's aluminum foundry at Massena, N. Y.

William H. Nolan was made vice president - marketing for **Moto-Mower Inc.**, Richmond, Ind., subsidiary of Dura Corp. He was director of sales.

John H. Dummer was made director of foreign operations for **International Resistance Co.**, Philadelphia. He succeeds **Jesse Marsten,** senior vice president, who retires Dec. 21, but will act as a consultant.

Carl J. Siebert Jr. was made general sales manager of **Aronson Machine Co. Inc.**, Arcade, N. Y.

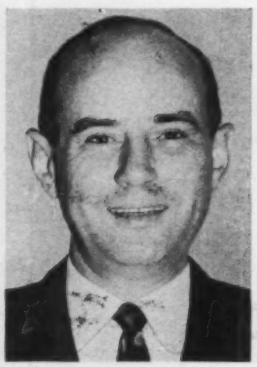
Patrick W. Timberlake was made head of **Northrop Corp.'s** International Div., Beverly Hills, Calif., to succeed **J. G. Nettleton,** who resigned to accept a position with International Telephone & Telegraph Corp. Mr. Timberlake has been a corporate vice president.

E. Colin Baldwin was elected president, **Sherwin - Williams Co.**, Cleveland, to succeed **Arthur W. Steudel,** elected chairman and chief executive officer. Mr. Baldwin was vice president-general manager.

John A. Zabo was made sales promotion manager, **Weldon Tool Co.**, Cleveland. He is in charge of domestic and export advertising and promotion for all Weldon products.

James H. Davidson was appointed vice president-marketing, **Rogers Industries Inc.**, Detroit. He was vice president-marketing and as-

ORVILLE C. CHRISTENSEN
joins Minneapolis Elec. Steel

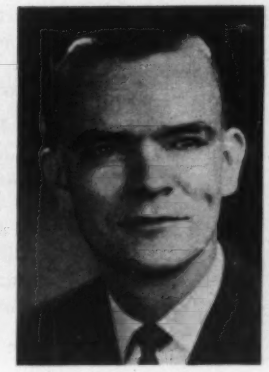


JOHN W. EDER JR.
Chicago Eye Shield sales

JOHN DUMMER
Internat. Resistance post

JAMES H. DAVIDSON
Rogers Industries v. p.

DONALD R. HEPLER
joins Brillion Iron Wks.



PETER A. LAIDLAW
Diamond Mfg. gen. sales mgr.

JOHN G. MORGAN
Hupp Aviation mfg. mgr.

EDMUND F. BURYAN
Minneapolis-Moline pres.

sistant to the president of Clinton Engines Corp.

Donald R. Hepler, former vice president-manufacturing, Cooper-Alloy Corp., joined **Brillion Iron Works Inc.,** Brillion, Wis., as manager of its Foundry Div.

Peter A. Laidlaw was appointed general sales manager, **Diamond Mfg. Co.,** Wyoming, Pa. He had been with Kaiser Aluminum & Chemical Sales Corp.

Frederick C. Irving Jr. was made manager-castings sales, **Aluminum Co. of America,** Pittsburgh. He succeeds **W. R. Butler,** recently named manager, Sales Development Divisions.

Safway Steel Products Inc., Milwaukee, appointed **Richard J. Penny** vice president-sales and marketing; **Arnold T. Hoenke** vice president - manufacturing; **Claude G. Robinson** engineering manager. Mr. Penny succeeds **Richard N. Vandekieft,** who in November was elected president.

John R. Warner joined **Ferry Cap & Set Screw Co.,** Cleveland, as sales promotion manager. He was assistant sales manager of Acme Machine Products Div., Muncie, Ind., Serrick Corp.

Wiliam R. Wyckoff was made marketing manager, Fabricated Products Div., West Newton, Pa., **Townsend Co.** He is succeeded as assistant sales manager, Engineered Fasteners Div., Ellwood City, Pa., by **P. F. Barry,** former Eastern district sales manager, Philadelphia. **R. M. Thompson** replaces Mr. Barry.

John G. Morgan was made manufacturing manager, **Hupp Aviation Div.,** Chicago, Hupp Corp. He was chief manufacturing engineer.

Paul C. Schoenfeld was named manager, coated sheet product sales, at **Weirton Steel Co.,** Weirton, W. Va., division of National Steel Corp.

L. E. Mineah was promoted to executive vice president and general manager, **Aero-Cal Metal Fabricators Inc.,** Gardena, Calif., subsidiary of Coast Pro-Seal & Mfg. Co.

Josef H. Buerger Jr. was appointed assistant to the vice president-commercial at **Crucible Steel Co. of America,** Pittsburgh. He was vice president-marketing with Yuba Consolidated Industries, San Francisco.

Harold C. Harsh was made general manager, **Ansco Div.,** Binghamton, N. Y., General Aniline & Film Corp. He replaces **Dr. Leopole F. Eckler,** vice president of the company who was appointed group executive in charge of the Ansco Div. and the Ozalid Div.

Donald E. Garr was named corporate director of engineering for **Raytheon Co.,** Waltham, Mass. He resigned as manager-engineering for General Electric Co.'s Armament & Control Section.

Leland E. Boren was elected president, **Pierce Industries Inc.,** Kansas City, Kans. He succeeds **Carl V. Rice,** who remains as chairman. Former executive vice president, Mr. Boren is also president of a subsidiary company, Pierce Governor Co. Inc., Anderson, Ind.

Edmund F. Buryan was elected president, chief executive officer of **Minneapolis-Moline Co.,** Hopkins, Minn. He resigned as marketing vice president of W. A. Sheaffer Pen Co.

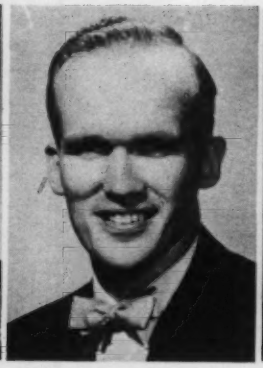
Charles K. Bonniville was made general purchasing agent, **Acme-Newport Steel Co.,** Newport, Ky. **James M. Ward Jr.** was made general traffic manager. **Harry M. Baker,** general purchasing agent and general traffic manager, retired Nov. 30.

Tapco Group, Thompson Ramo Wooldridge Inc., Cleveland, will combine into a single organization its electronics and power systems manufacturing operations, effective Jan. 1. **Burt J. Crobaugh** will manage the integrated facility at the Tapco plant. He was power systems manager. The Electronics Works, previously managed by **James W. Davidson,** will move operations to the Tapco plant. The organization will be named Power Systems. Mr. Davidson will assume new duties after the first of the year as assistant to Tapco's general manager.

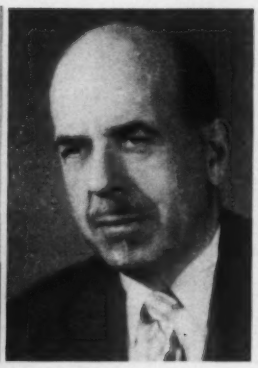
Joseph E. Ellison was promoted to factory manager, **Western Automatic Machine Screw Co.,** Elyria, Ohio, division of Standard Screw Co. He was manager of the Moen Faucet and Electric Foundry Divisions, which he continues to supervise.

Chrysler Corp., Detroit, changed the title of **R. P. Laughna** to vice president-marketing from vice president-corporate planning staff, and increased his responsibilities. He reports to **Lynn A. Townsend,** re-

GILBERT K. STEELY
Greer Steel executive



H. S. BALDWIN
Sheffield rolling mills supt.



LESLIE S. MORRILL
Lyon Metal plant mgr.

THOMAS F. HUMPHREY
new post at Temptron Inc.

ROBERT M. GORDON
Milford Rivet exec. v. p.

ELWOOD F. KNAPP
Firewel mfg. v. p.

cently named administrative vice president.

Thomas F. Humphrey fills the new post of vice president and general manager, **Temptron Inc.**, Reseda, Calif. Formerly with Atomics International, division of North American Aviation Inc., as director, contract administration, he was also with North American Aviation Inc. as project administrator.

Robert M. Gordon was elected executive vice president of **Milford Rivet & Machine Co.**, Milford, Conn. For the last three years, he has been vice president-sales.

William B. Shimer joined **Borg-Warner Corp.**, Chicago, as director of manufacturing services. He was associated with Chrysler Corp.'s automotive operations for the last 12 years. Mr. Shimer succeeds **William F. Martin,** recently appointed vice president and assistant general manager of B&W's Mechanics Universal Joint Div.

Elwood F. Knapp was named vice president - manufacturing, **Firewel Co. Inc.**, Buffalo, subsidiary which serves as the Aeronautical Div. of Aro Equipment Corp. He will supervise manufacturing (including development engineering), quality control, and purchasing. Mr. Knapp joined Firewel in 1959 as plant manager at the time it was acquired by Aro Equipment. Previously, he served Aro's Cleveland plant as manager, Aircraft Div.

Richard E. Johnson was made assistant purchasing director of U. S. Steel Corp.'s **American Steel & Wire Div.**, Cleveland. **Edward Szura, Rudolph G. Miller,** and **Lawrence H. Lavette** were made purchasing agents of the wire division, and **Ben G. Singley** was made staff assistant-purchasing research.

Benjamin H. Pritchard and **William B. Seemann** were named assistant purchasing agents of **Youngstown Sheet & Tube Co.**, Youngstown.

Gilbert K. Steely was elected secretary and general sales manager, **Greer Steel Co.**, Dover, Ohio. He succeeds **L. N. Douglass,** retired.

H. S. Baldwin was appointed superintendent of rolling mills of the Kansas City, Mo., Works, **Sheffield Div.**, Armco Steel Corp. He succeeds **A. H. Griffiths,** who continues as rolling mill consultant with the Kansas City Works until retirement in March.

Leslie S. Morrill was appointed plant manager at **Lyon Metal Products Inc.'s** new Los Angeles plant. He was manager of the combined production engineering, estimating, and planning departments of Lyon, whose general offices are in Aurora, Ill.

Gordon R. Loveless was made manager of **Chicago Bridge & Iron Co.'s** Eastern plant at Greenville, Pa., effective Jan. 16. He is succeeded by **Alfred J. Larson** as manager of the Salt Lake City, Utah, plant.

Pressed Steel Tank Co., Milwaukee, formed new East-West sales areas. **James A. Varnado** heads the Eastern Div., (Marshfield, Mass.; Clifton, N. J., the New York area; Downingtown, Pa.; Columbus, Ohio; Atlanta; and Orlando, Fla.). He has headquarters in Downingtown. **Robert A. Hirst** is regional sales manager, Western Div. (Detroit, St. Louis, Chicago, Milwaukee, Minneapolis, and Los Angeles). He is in Milwaukee.

Gleason Works, Rochester, N. Y., promoted **Arthur G. Matthies** to chief industrial engineer; **Edgar J. Whitcomb** to plant engineer; **Nicholas J. Dargento** to services engineer.

Harold M. Flye, Leroy A. Johnson and **Harry J. Van Dolah** were made vice presidents of **Chicago Vitreous Corp.**, Cicero, Ill., division of Eagle-Picher Co. Mr. Flye was made vice president-comptroller; Mr. Johnson vice president-frit sales and service; Mr. Van Dolah vice president-frit research and development.

D. J. Bastian was made plant operations manager of **Ford Motor Co.'s** new Automotive Assembly Div., Dearborn, Mich. He was Ford's Los Angeles assembly plant manager. **James Knowles,** former executive assistant to the vice president-manufacturing, was made

A. C. PRUDNER

KENNETH E. LEWIS

RODERICK S. O'CONNOR

EDWARD N. NELSON

appointments for Jones & Laughlin Stainless & Strip Div.

quality control manager of the new division.

Pierce Hollingsworth was appointed manager, Industrial Gas Cleaning Dept., Metal Products Div., **Koppers Co. Inc.**, Baltimore. He was chief engineer of the division's Coupling Dept.

W. C. Jansen was made sales manager of the new Commercial Sound Dept. of **North American Philips Co. Inc.'s** High Fidelity Products Div., New York.

A. S. Blodget Jr. was made regional vice president of **Air Reduction Sales Co.'s** Midwestern region, with headquarters in Chicago. He succeeds **D. D. Spoor**, retired.

Charles S. LeCraw Jr. was appointed assistant to the director in the Market Development Div. of **United States Steel Corp.**, Pittsburgh.

Robert W. Anderson was made New England district sales manager of **Arcos Corp.**, with headquarters in Boston.

Rolf Lindenhayn Jr. was made Western Div. (San Francisco) manager of brush and railroad products for **National Carbon Co.**, division of Union Carbide Corp. He succeeds **H. D. VanArtsdale**, who assumed new responsibilities with Union Carbide International Co.

Edward L. Falls Jr. was made general manager, **Motorola Aviation Electronics Inc.**, Culver City, Calif., to succeed **Kenneth M. Miller**, resigned. Mr. Falls was a vice president of Motorola Communications & Electronics Inc., Chicago.

Jones & Laughlin Steel Corp.'s Stainless & Strip Div. appointed **A. C. Prudner** plant manager-Youngstown. He continues as manager-Indianapolis plant. **Kenneth E. Lewis** fills the new post of plant manager-Detroit. He was division manager-quality and process control in Detroit, and is replaced by **Roderick S. O'Connor. Edward N. Nelson** was made product manager-carbon and coated strip steels, Youngstown plant, and is replaced by **William Brenner Jr.** as supervisor of quality control.

J. J. Laputka was elected financial vice president, **Air Products Inc.**, Allentown, Pa. Before joining Air Products, he held a similar post with Gorham Mfg. Co.

Daystrom Inc.'s Control Systems Div., La Jolla, Calif., appointed **John Warner** sales manager-Control Systems Products Dept.; **Thomas Waldrop** to sales manager-systems.

John M. O'Brien succeeds **A. C. Kraft**, retired, as manager of the New York office of **Caterpillar Tractor Co.**

Magnetics Inc., Butler, Pa., appointed four vice presidents: **J. C. Brandon Jr.**, engineering; **Robert W. Olmsted**, marketing; **Charles B. Wakeman**, research and development; and **Elmer B. Kaelin**, manufacturing.

J. Walter Guyer was appointed director of special projects for **Ren Plastics Inc.**, Lansing, Mich. He was director of development laboratories.

John C. Pugh was made sales manager, St. Louis district, for **United States Steel Corp.** He succeeds **Edward W. Backes**, recently made director of trade relations, Pittsburgh.

Rendall E. Holland joined **American Drill Bushing Co.** as Southwest manager. He is in Dallas.

John P. Macri was named sales manager for the recently formed Data Communications & Customs Projects Dept., **Radio Corp. of America**, New York.

L. A. Napper was made assistant to chief engineer, fabricated steel construction, for Pacific Coast Div., **Bethlehem Steel Co.**, in San Francisco.

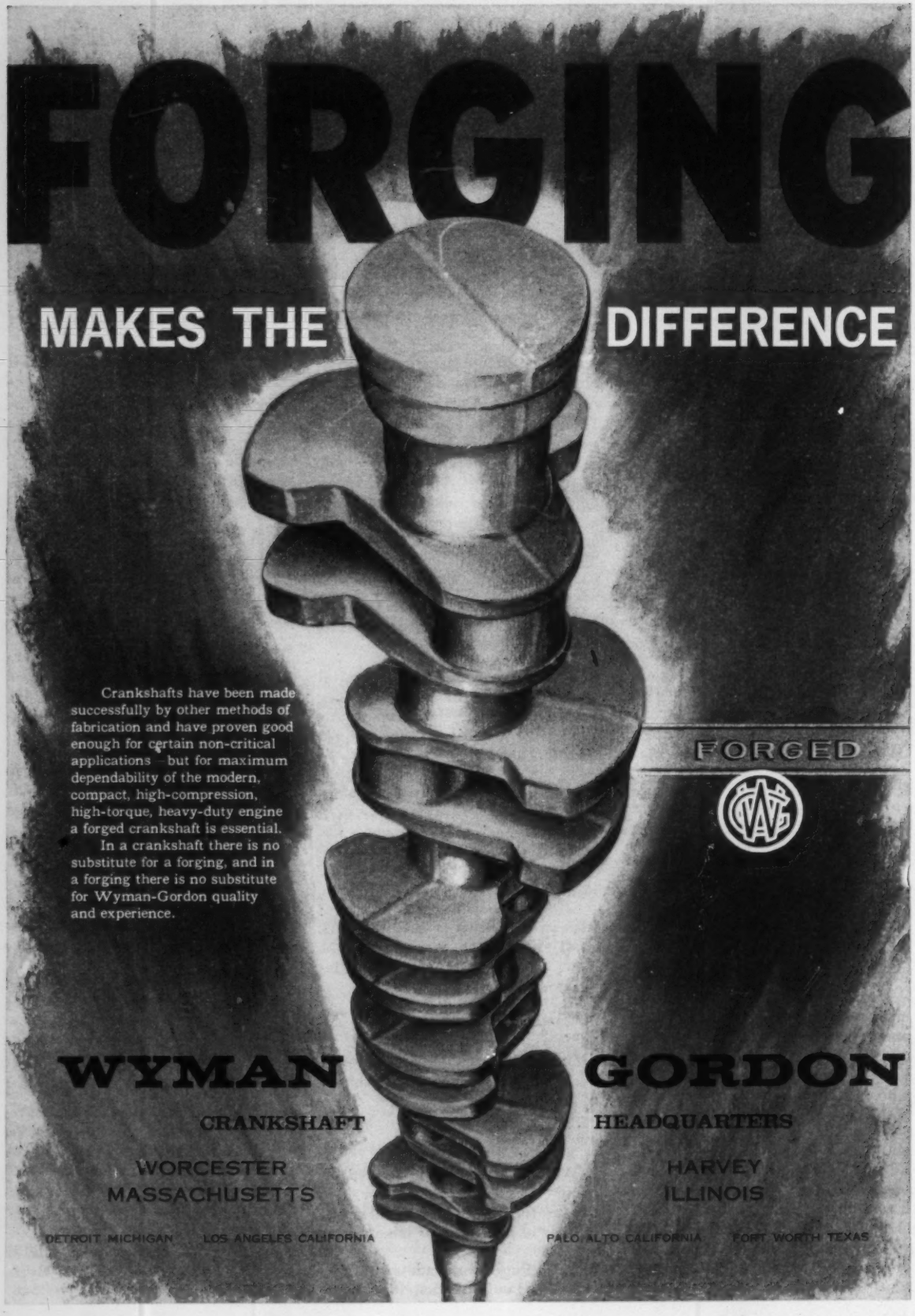
Development Engineering Corp. appointed **Dr. Wilbur B. Davenport Jr.** chief staff scientist at its Boston Div.

Harry H. Bauer was made Midwestern regional sales manager for Scientific & Process Instruments Div., **Beckman Instruments Inc.**, Fullerton, Calif.

James D. Helm was made Eastern regional sales manager for **General Electric Co.'s** Computer Dept., New York. He was regional manager, Communication Products Dept., Columbus.

J. H. Berryman was made manager, Special Products Dept., Union, N. J., **Air Reduction Sales Co.**, division of Air Reduction Co. Inc. **Robert A. Stone** was made sales manager of the department.

George B. Coffey was made central regional manager for **A. M. Byers Co.** in Chicago.


FORGING
MAKES THE DIFFERENCE
Crankshafts have been made successfully by other methods of fabrication and have proven good enough for certain non-critical applications—but for maximum dependability of the modern, compact, high-compression, high-torque, heavy-duty engine a forged crankshaft is essential.
In a crankshaft there is no substitute for a forging, and in a forging there is no substitute for Wyman-Gordon quality and experience.
FORGED
WYMAN GORDON
CRANKSHAFT HEADQUARTERS
WORCESTER MASSACHUSETTS
HARVEY ILLINOIS
DETROIT MICHIGAN LOS ANGELES CALIFORNIA PALO ALTO CALIFORNIA FORT WORTH TEXAS

WIDENS WELDING HORIZON—Speeds up to 300 ipm are being achieved with mild steel by Midland-Ross Corp., Cleveland. The firm employs CO_2 and automatic fixturing to produce auto frames. Other advantages of the firm's technique: It minimizes distortion, improves control of quality, saves floor space, permits touchup repairs of subassemblies to be made at assembly point. One drawback: Although fewer operators are required, greater skill and training are needed.

NEW ROLE FOR PLASTICS—A plastic which conducts electricity has been announced by Dr. A. Wasserman, University College, London. Ion pairs in nonpolar solvents do the conducting. There is a possibility that the solid plastic is also conductive.

IMPROVED MEMORY—A new cathode ray tube can remember and reproduce signals it records up to 2 hours after they have been received, claims Raytheon Co., Waltham, Mass. On pathfinder radar sets, it permits operators to trace the paths of moving objects.

FASTER, FASTER, FASTER—Models are being studied at Mach 8 to get information on air travel at five times the speed of sound. Results of the Air Force project will guide engineers in the design of craft that will have 70 degree sweptback wings and travel 300 miles high, says Aerojet-General Corp., a subsidiary of General Tire & Rubber Co., Azusa, Calif.

SATIN NICKEL—A new kind of plating technique produces a satin finished nickel (Satylite) directly from the plating bath. Udylite Corp., Detroit, says neither hand polishing nor buffing is needed.

HOT METAL LUBRICANT—A phosphate system ($K/Na/P_2O_5$) developed in West Germany is being used to lubricate metals being formed at 1100 to 2200° F. The product is marketed in this country under the name Phosphatherm RN by Alpha-Molykote Corp., Stamford, Conn. It is said to increase mandrel life ten times in piercing seamless tubing. Variations may contain additions of borax, alkali halides, sulfates, or heavy metal phosphates. They can be applied wet or dry.

SOUND DAMAGE STUDY—Effects of noise and vibration on aircraft and missile structures will be studied at Andrews Air Force Base, Md., in a new sonic chamber. The noise (174 decibels at 5000 to 10,000 cycles) will be generated by 37 sirens. They'll be driven with compressed air supplied by a 40,000 hp pump.

IMPROVING LUMINOSITY—The Atomic Energy Commission now permits application of radioactive tritium (hydrogen 3) to the dials of luminous watches and clocks. The material is said to be safer than radium—the low energy beta particles the substance emits can't penetrate a watch crystal or the outer layer of human skin.

CUTS SHIPPING LOSS—A new hydraulic device for freight cars absorbs about 40 per cent of normal bumping and pulling shocks. If adopted, the device can effectively cut loss and damage, claims Keystone Railway Equipment Co., Chicago.

NEW FUEL CELL ENTRY—An experimental, 2 watt battery is the forerunner of a device about the size of a large packing crate that will generate 10,000 watts of current from natural gas, water, and air, claims the Institute of Gas Technology, Chicago. Goal: A unit for the average home.

CANNED WELDING WIRE—To eliminate porosity caused by water vapor, high carbon welding wire for high strength steels (above 240,000 psi) should be vacuum packed, recommends Dr. G. K. Bhat, Mellon Institute, Pittsburgh.

PMI's Miller holds new type sprue as he tells why . . .

Hollow Tree Castings Have Big Potential

Starting around the hollow sprue . . . .

BY NOT casting metal, Precision Metalsmiths Inc. is providing possibilities for substantial savings at its Cleveland plant. It is using a hollow sprue in place of a solid conventional core for building up the "tree" for a foundry mold. It's one of several steps being taken to hold down prices of precision castings.

The hollow sprue, cuts the weight ratio of gating system to finished castings to as low as 1:1 (previous practice had been several times that value); at the same time, casting quality is improved.

• Additional source of savings: A mechanized line for the production of shells for the ceramic shell molding process.

. . . . and using a conveyor storage line . . . .

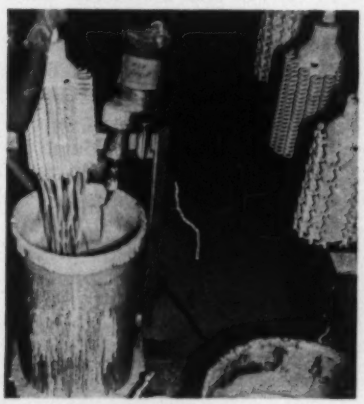
. . . . the wax or plastic tree is built up

Robert Miller, PMI president, sums up advantages of the process:

- More pieces can be produced per setup and per manhour.
- For the same number of castings, savings can be realized in metal and melt time.
- Less wax is used.
- Reduced weight makes handling easier.
- Thermal gradient is reduced.
- Faster cooling cuts decarburization.
- Hardnesses are more uniform.

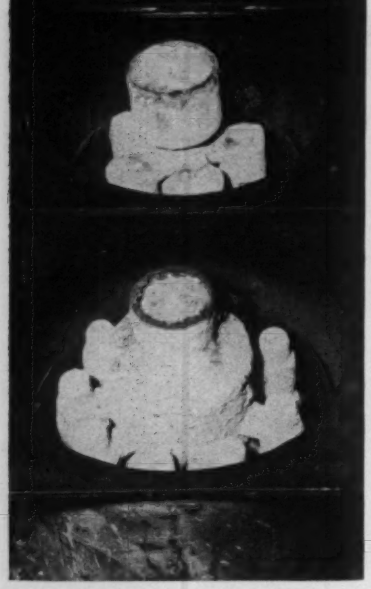
While the center, or sprue, of the assembly is still wax, it starts off as a tube rather than as a solid section. Dimensions of the tube will vary; length, diameter, and wall section are adjusted to the

it is dipped . . . .



excess is spun off . . . .

stuccoed with sand



Casting uses vacuum

Ceramic is shaken free

job that's being programed.

The company is finding that previous ideas about the thickness of the sprue necessary to feed the castings need changing. Use of the ceramic shell process allows rapid solidification of the castings, so that shrinkage occurs rapidly and the sprue metal need not be molten for a long period to assure a solid part. The relatively thin walls of the sprue are apparent in the photographs, yet the castings pass radiographic inspection.

• Around the hollow wax sprue, the casting patterns are assembled in the usual fashion.

Patterns may be of wax or plastic. Choice depends on such factors as the length of the production run, with longer runs favoring use of plastics. Less metal in the sprue means that, for a given size heat, more cast parts are produced. For that reason, the diameter of the sprue can be increased and more parts are placed in each row.

Next step is investing the pattern. While flasks are used for some jobs, particularly on older patterns used for short runs, all of the new jobs are being planned for ceramic shell molding.

• The shell preparation steps are the same whether wax or plastic patterns (see STEEL, May 9, p. 140) are used, but improvements have been made in the handling operations. They reduce total handling time during investing to about 5 minutes per mold.

Building up the shell around the wax or plastic patterns requires a series of steps: Parts are dipped in a ceramic slip or slurry, then coated with a granular refractory material. The process is repeated to develop the desired thickness. But some drying is required before dipping in the slip.

In the new arrangement, Research Director Claude Watts has worked out a conveyorized drying cycle. The "trees" are dipped in the slip, spun to remove excess, coated with granular refractory by dipping in a fluidized bed, and hung on the conveyor. Those operations take less than 1 minute. Conveyor round trip is about an hour; when the trees return to the operator, they are dry and ready for the next dip coat. After building up the proper number of layers, the "stuccoed" patterns are ready for the foundryroom.

• A high temperature burnout operation removes the wax or plastic patterns, partially sets the ceramic.

After burnout, the shells may be stored. Regardless of whether they come from storage or direct from burnout, shells are heated in a furnace prior to making the cast. That further sets the ceramic, and reduces heat shock on casting.

• Much of the casting is done with the aid of vacuum.

Molds are placed in special vacuum vessels. A metal plate covers the top after the mold is in place. Gaskets seal the openings. A quick-acting valve opens the vacuum line before the metal is poured.

Induction furnaces melt the alloy. Temperature is checked before pouring. Immediately after pouring, the gaskets are removed.

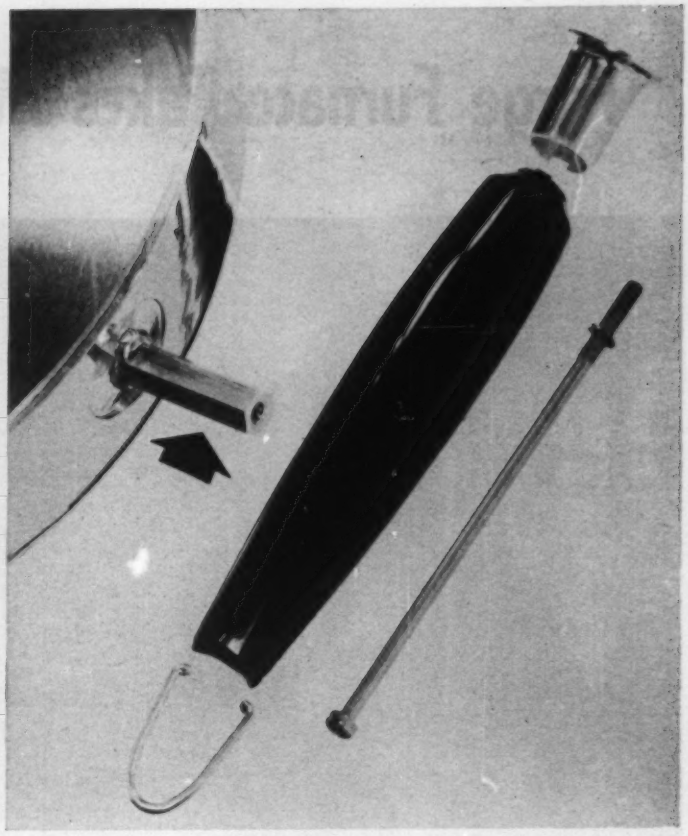
• With the hollow sprue, there is less variation in cooling time between the outer portion of the cast setup and the inner; there is less metal in the sprue to hold the heat.

One result is a reduction in hardness variation. On a particular part, using a solid flask type of mold, the outer portion on a Stellite casting had a Rockwell hardness of C 49, the portion adjacent to the sprue was C 41. Using the shell mold and a solid tree, the outer portion measured C 55 average and the inner section was C 49. And a typical casting made with the hollow sprue method showed C 49½ and C 52 for the same locations. So each change reduced the spread in hardness.

Cleaning of the castings, and cutting them away from the sprue, is much the same for the hollow type as it is for solid. There is a tendency for the shell to spall on cooling, but use of a vibrating hammer for removal is standard procedure. Compared with breaking out a solid flask, there is a marked reduction in time.

• [illegible] improvements are credited with [illegible]ng down costs while producing [illegible]er castings.

Mr. [illegible]ller cites as examples both ferrous and nonferrous parts produced in 1951, and still being made, to show how prices have been reduced. A price of $2.25 became $1.32, a part once costing $1.25 now brings 68 cents, and a tab of $2.96 has been reduced to $1.91. Since materials costs have been going up, the savings are attributable to improvements in the process which permit the production of more parts per manhour. And in the same period, it has led to a fivefold increase in employment to produce the increased volume of parts.



Aluminum utensil maker tells . . .

How the Pot Got a Better Handle

Its strength is increased by studwelding a female connector to the pan body. Other gains include an improvement in design and appearance, says chief engineer at Wear-Ever

THREE NEW production units which incorporate studwelders fasten female handle studs onto the bodies of utensils made at Wear-Ever Aluminum Inc., a subsidiary of Aluminum Co. of America, New Kensington, Pa.

It's a new approach that has brought cost savings as well as improvements in design.

V. W. Riecka, chief engineer at Wear-Ever, says that studwelding is ideal for attaching handles and that the process plays an important role in making the utensils attractive.

"It's a new approach for us," he says.

• Handles have four parts.

Once the female stud has been attached to the utensil body, an operator assembles an aluminum ferrule, plastic handle, and threaded bolt. An air operated, torque wrench permits accurate tightening.

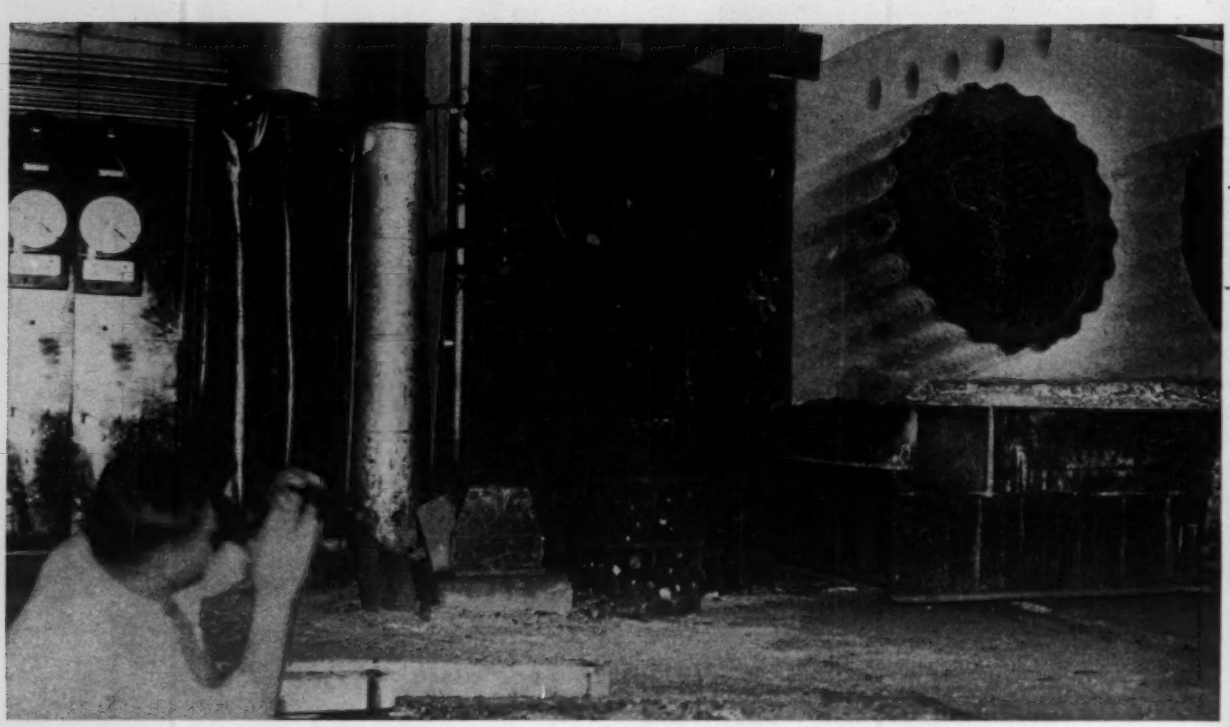
The same female stud is used on all types of utensils made by Wear-Ever.

• Studwelding permits fastening handles strongly in a small, well concealed area.

The new joint is as strong as former ones—which were made via riveting, brazing, spotwelding, and welding with a hand torch, state Wear-Ever officials. In tensile tests, the wall of the utensil tears, not the stud joint. The limitation, of course, is the wall thickness of the utensil. If the gage is too thin, holding power won't be great enough.

Studwelders are incorporated in an automatic production line. Welding is done in an inert atmosphere.

Forge Furnace Takes Minimum Space but



High velocity burners and dampers insure uniform heat

A NEW DESIGN APPROACH saved space and reduced initial cost of a furnace used to heat king sized ingots at Industrial Forge & Steel Div., Republic Industrial Corp., Canton, Ohio. Much of the design work was done by the division's engineering personnel.

An automatic, furnace pressure control system permits high velocity burners to be installed in the upper sidewall, adjacent to the flues, which are mounted on the roof. That eliminates the need for double walls, typical of furnaces with flues at the hearth level. Burners and pressure control equipment were supplied by North American Mfg. Co., Cleveland.

• The furnace had to be placed near the forging press, to minimize heat loss in transferring material from the hearth to the forging dies. And space in the press area was at a premium.

"Our shop needed a new forge heating unit to permit handling of larger ingots," says Paul H. Lessard, vice president-operations at Industrial Forge & Steel. "A soaking pit was ruled out, because of lack of headroom; other conventional furnaces would have required expensive building alterations to permit installation near the press.

"We built a car-bottom furnace because it could be placed outside the building proper, saving plant space. The car made it possible to move heated loads to the area of the manipulator and press. A flat, suspended roof was used on the furnace, because a conventional, arched roof wouldn't fit into the available space."

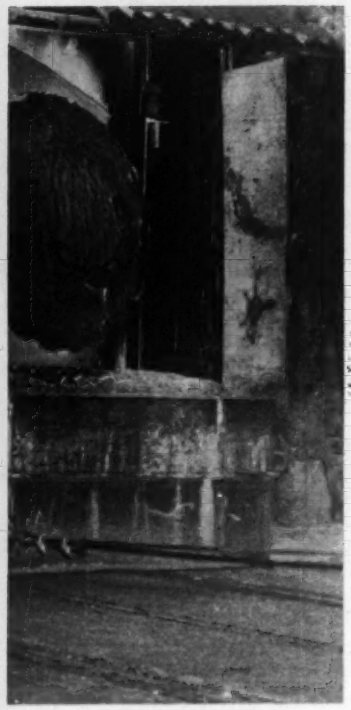
Use of high velocity burners and maintenance of slight pressure at the furnace hearth (0.020 in. water column) prevent infiltration of cold air and cause combustion products to recirculate around the furnace before they exit through the flues.

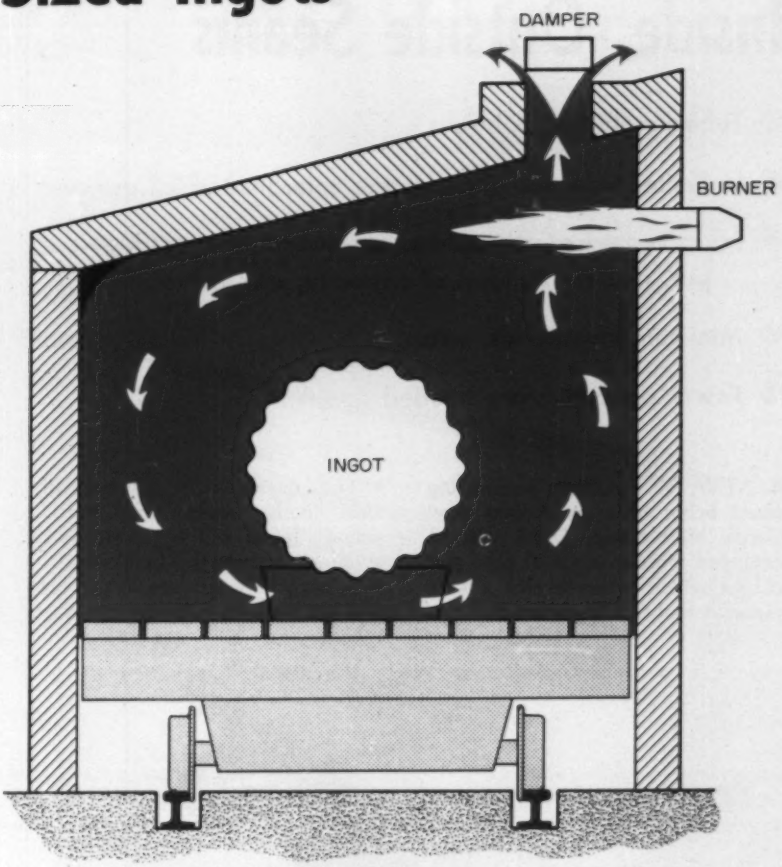
"Uniform furnace temperatures and a slightly reducing atmosphere (from a slightly rich fuel-air mixture) make for high metallurgical quality in the forgings produced, and minimum metal loss from scaling," says Robert E. McCurdy, fuel and combustion control engineer. "Low scale formation rates and short transfer time from furnace to press also permit a saving on fuel."

• Pressure control permits the furnace to be used for various heat cycles for different applications.

The company melts steel in two

Handles King Sized Ingots





open hearth furnaces and pours some of its own ingots, but its function as a job shop—processing steel, alloys, and rare metals purchased from another source—makes a versatile heating furnace desirable.

Ingots are heated to temperatures up to 2400° F in the forge furnace, but it is used for stress relieving, equalizing, or any other heat application in the accuracy range of 1400 to 2400° F. It has been used for stress relieving at temperatures as low as 1100° F; extremely good results were reported.

Burners operate at a combustion air pressure of 16 ounces per square inch, with a gross hourly input of 20 million Btu. Velocity is 350 ft a second at the burner nozzle.

• Rigid understructure and single wall design make the furnace capable of handling heavy loads of large section ingots.

Heavy H-beams, imbedded in concrete, form a rigid base. The steel framework of the furnace is welded and bolted. Total weight of the furnace car is about 350,000 lb; car carrying capacity is about 250,000 lb.

The 12 by 20 ft hearth area is heated in two zones, to allow charging of heterogeneous pieces. Two round, corrugated type ingots, each weighing 75,000 lb (diameter, 76 in.) can be loaded into the furnace. Smaller pieces of steel can be placed on the back or front of the car.

Furnace walls and roof are of plastic, refractory material, rammed over corrugated anchor bricks. The furnace car is also of monolithic construction. One sidewall of the furnace is 8 ft high; the other is 11 ft high. Eight, high velocity burners are mounted at the top of the higher wall.

• Dampers, mounted in the roof directly over the burners, are operated by the automatic pressure control system.

Design of the damper control system is uncomplicated.

Three dampers, each 20 in. square, are mounted on flues at the top of the furnace. They are opened and closed automatically, in tandem, to maintain the right pressure in the furnace zones.

Pressure changes inside the furnace are sensed by the diaphragm of the pressure regulator system. Movement of the diaphragm is transmitted to a high gain, hydraulic amplifier that directs flow of fluid to the damper control cylinder.

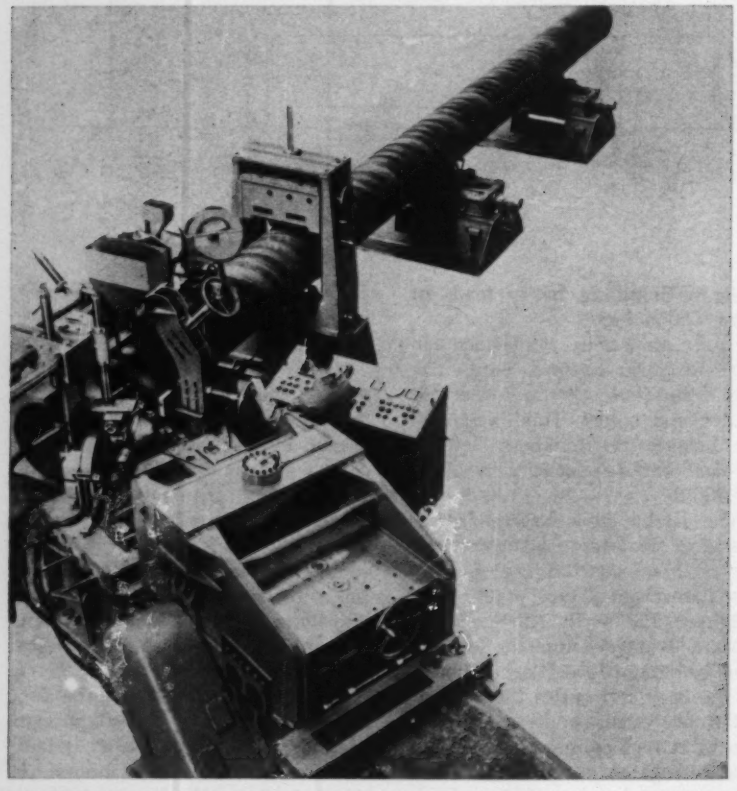
Spiral Pipe Machine Welds Inside, Outside Seams

- Tube length is flexible.
- Unlimited selection of diameters, tolerance of 0.2 per cent.
- For a comparatively modest investment, you get high output, orderly buildup of capacity, and portability.
- Minimum inventories, scrap.
- Fewer operators are needed.

A NEW, $2.5 million pipemaking plant being built by Armco Steel Corp., Middletown, Ohio, will be equipped with two, spiral pipe machines which offer several advantages to maker and customer:

• The device will automatically weld both inside and outside seams. Joints will be as strong as or stronger than the base metal.

• Spiral pipe joints are 25 per cent stronger than a previous product.



Coiled strip enters spiral pipe machine from lower right. Power rolls force steel into spiral train as submerged arcwelders buttweld the edges into a continuous pipe

The older equipment employed by Armco welded only one seam, giving up to 80 per cent of theoretical strength.

An added advantage to the user: The new equipment can be made portable for those who prefer to make their own pipes near or adjacent to a construction site, claims the machinemaker, Driam Corp., Manitowoc, Wis.

• The pipe machine bends strip into an accurate spiral. The joints are then automatically welded inside and out by any of a variety of processes.

Hot rolled steel down to 16 gage, explain Driam officials, is butt seamwelded with submerged arc. Thin gages (16 and under) are resistance welded with an overlapping seam. Inert gas techniques are employed for small diameter tubing. The first high frequency, resistance welding unit is expected to go into production early in 1961.

Typical examples of pipemaking speed: 16 in. pipe, 1/8 in. wall made from 25 in. strip, is turned out at 3.94 fpm; 8 5/8 in. pipe, 1/8 in. wall, rolls out at 3.75 fpm. Submerged arcwelding speed is 68 ipm.

Auxiliary units permit the corrugating of pipe as it is welded. Provisions are also made for an ultrasonic testing head which continuously evaluates weld quality. When defects are detected, the device sprays paint automatically on the suspected area and sounds audible or visible alarms. Such areas may then be further checked with x-ray or destructive tests.

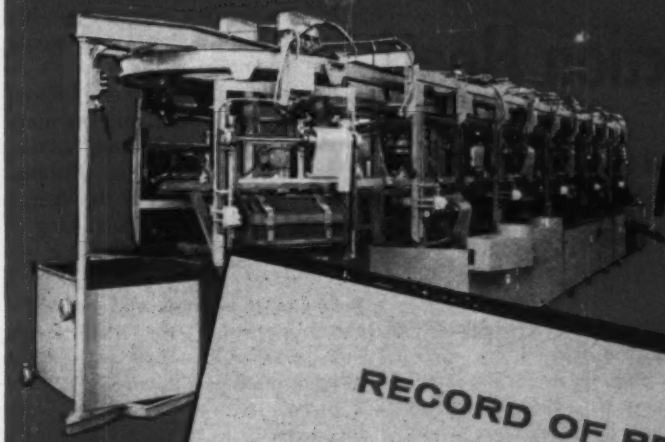
The new product will probably be sold at the same price as the pipe with the single weld.

• Driam officials claim spiral pipe welded on both sides is 25 per cent stronger than longitudinally welded pipe.

Spiral pipe has an inherent "bandage effect," which is said by some authorities to increase loop strength—for example, a gas transmission firm, a German authority, and a U. S. testing company are said to agree that the pipe is stronger. Others disagree. One steelmaker checked by STEEL said its tests didn't show much difference in strength between the two types.

the Udylite V.I.P.

an outstanding production record



RECORD OF PERFORMANCE

EQUIPMENT:	**V.I.P.** automatic barrel plating machine
OWNER:	The Production Finishing Company
LOCATION:	Cleveland, Ohio
OPERATION:	Job shop—zinc plating
BARREL LOADS:	As high as 200 lbs. per cylinder
MAINTENANCE:	Minimum—practically no down time or expenditure for months
PRODUCTION:	Ability to run "around the clock"
PLATING:	Excellent uniformity of thickness and quality due to precise control.

Learn the full story of V.I.P. and you'll discover how this efficient modern equipment can give you a competitive edge. Get the facts today—from your Udylite man or write directly to

the udylite

world's largest plating supplier

corporation • Detroit 11, Michigan

on the west coast: the L. H. Butcher Company

Direct Reduction Process Provides Own Reaction Heat

Mixture containing aluminum, silicon, and titanium is blended with ore and ignited; combustion heat helps reduce iron oxides, producing mild steel

WASTE ROCK from coal mines may be an important raw material in a steelmaking process called "Mts" (metallothermic steelmaking) being considered in Europe. A pilot plant is in operation at Ponferrada, Spain.

The process is described in *Stahl und Eisen*, a German publication, by its inventor, Anton Wimmer, of Hohenlimburg. A complete translation is available from Henry Brutcher, Altadena, Calif.

• Conventional fuels are not used in the process. Heat for the final reduction step is supplied by the chemical reaction of metal fuel, made from low grade, carbonaceous materials, preparation of which requires large amounts of electric power.

The two principal reducing elements used in the process—aluminum and silicon—must be so proportioned that steel and slag are liquefied without externally applied heat. Iron oxides are reduced directly to nearly carbonfree iron; intermediate production of high carbon pig isn't necessary.

No provision has to be made for gas and air blast in plant construction. And cooling water requirements are modest.

Calculations and pilot plant experience indicate that material containing about 20 per cent carbon (such as waste rock from coal mining) is suitable for preparation of metal mixtures for the process. Economic advantages must be balanced against the relatively high expenditure for electric power.

• The mixture for the metal fuel is ground, briqueted, en reduced to a liquid alloy.

The proportions must insure the right amount of carbon for reduction of oxides in the mixture which contains alumina, silica, titanium dioxide, ferrous oxide, and ferric oxide. Carbon content is 20 to 23 per cent of the total charge, and can be regulated by addition of any fine grained or powdered carbon waste, such as coal dust or coke breeze.

Briquets (size: 1⅛ to 1½ in.) made from the mixture are reduced and melted in a three-phase electric furnace, almost without slag. Molten alloy is run off at 2 to 3 hour intervals. Process conditions are similar to those in ferrosilicon production. Chemical composition of the metal fuel may vary widely, depending on alumina and silica content of the briquets. Reactivity of the fuel decreases rapidly as the aluminum-iron ratio drops.

• Oxides in iron ore are reduced to low carbon steel by the metal fuel.

Iron ore and metal fuel are mixed and charged—in powdered or granulated form—into a reaction vessel, which may be no more than a covered ladle with a lance introduced from above. A modified, rotary converter vessel has been used successfully.

Proportion of slag-building materials shouldn't be more than 12 per cent. Ore containing less than 55 per cent iron can also be used as supplementary charge material. And low iron content of ore can be offset by higher quality metal fuel. Addition of burned lime provides a reactive slag.

• The iron ore and metal fuel are ignited in the reaction vessel with a material that contains a few grams of barium peroxide, aluminum, and magnesium.

In continuous operation, hot walls of the reaction vessel would ignite the charge.

Iron oxides in the ore are reduced by aluminum, silicon, and titanium, producing oxides of those metals, and metallic iron. Heat liberated in the reaction liquefies the charge in 8 to 15 minutes, producing a temperature of 2770 to 2880° F.

• Chemical analysis and mechanical properties of the product are said to be comparable with those of conventional, mild steel.

About half the carbon in the metal fuel is removed after the charge is ignited; removal of the remaining 0.3 to 5 per cent is said to present no problem. Decarbonization is usually completed in 3 to 4 minutes. Under favorable conditions, carbon content can be reduced to 0.01 per cent or less in a short time, says the inventor.

Manganese in the metal fuel (and usually that in the ore) passes into the slag during production of mild steel. Phosphorus from the metal fuel is partially removed during combustion; sulfur is removed during metal fuel production. But phosphorus and sulfur in the iron ore require operation of the process as a basic reaction. Silicon is removed by oxidation after the slag is pulled.

Nitrogen in the metal fuel isn't absorbed by the molten steel. If nitrogenfree gases are used for blowing (to agitate steel and slag, producing an equilibrium), the final analysis includes 0.003 to 0.005 per cent nitrogen. Compressed air blowing causes slight nitrogen pickup, making the final content about 0.009 per cent. Hydrogen blowing provides low carbon and nitrogen contents, but causes ingots to swell. That effect can be neutralized by a 40 to 50 second afterflow with argon.

Carbon monoxide is said to give good results as a bubbling gas, because it doesn't dissolve appreciably in the steel. But its carburizing effect limits its use to mild steels containing more than 0.03 per cent carbon.

HOT STRIP MILL

Designed and Built by MESTA

FIRST with fully automatic controlled roughing mill

MESTA 44" Hot Strip Mill installation . . . including Vertical Edging Mill, Universal Reversing Roughing Mill, and six Finishing Mill Stands with three Finishing Vertical Edging Mills . . . at the Aliquippa Works of Jones & Laughlin Steel Corporation.

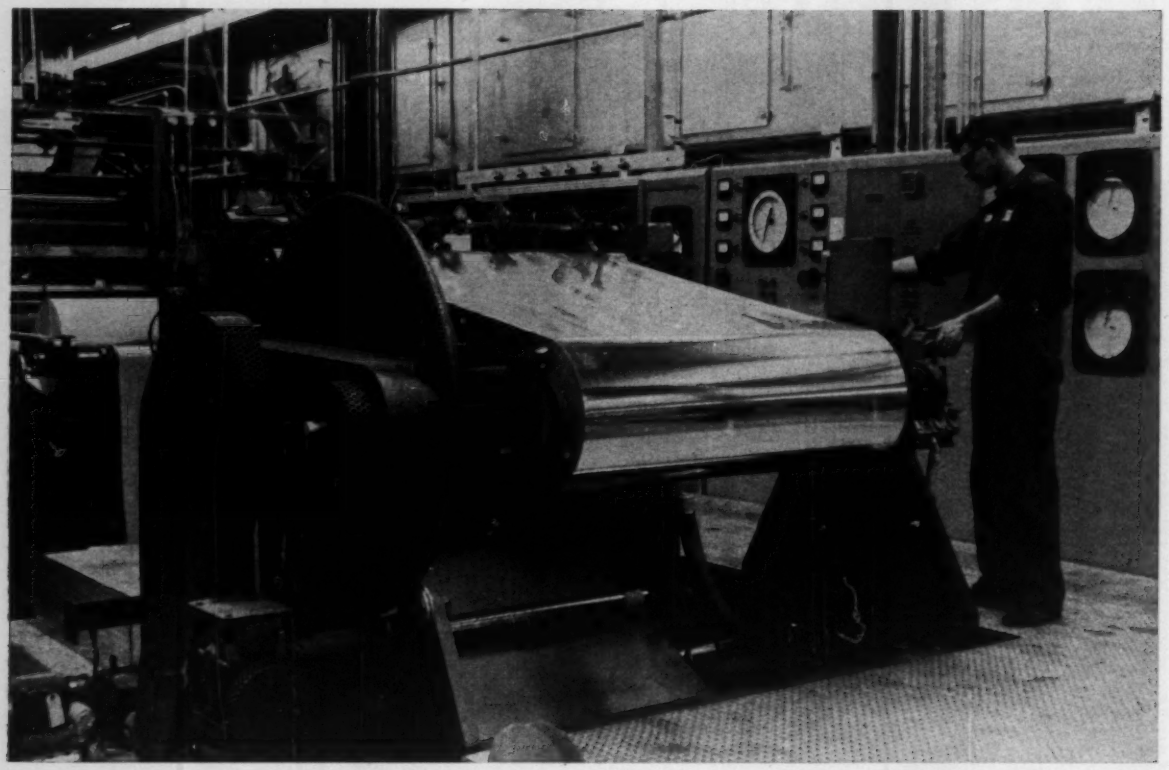
Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

When given a coating of a pressure sensitive adhesive . . .

Stainless Steel Foil Sticks Tight



YOU CAN cover surfaces with 0.003 in. stainless steel easily and quickly with a pressure sensitive adhesive coated foil developed by Fasson Products Div. of Avery Adhesive Products Inc., Painesville, Ohio.

It goes on smoothly (no fasteners are required) and the foil can cut costs where greater thicknesses aren't required. Example: The company predicts it'll be cheaper to use the foil instead of stainless steel tile shapes for many sanitary and decorative purposes.

• Applications include architectural and decorative panels, signs, serial plates, metal furniture, and corrosion protection.

Fasson says it can be advantageously used where fasteners would create problems in installation or labor (kickplates for glass doors, for example).

The company also suggests use of the foil as trim for panels in curtain wall construction. Another suggestion: Cover for seams in panel ceilings.

• The adhesive will stick to most clean, smooth surfaces.

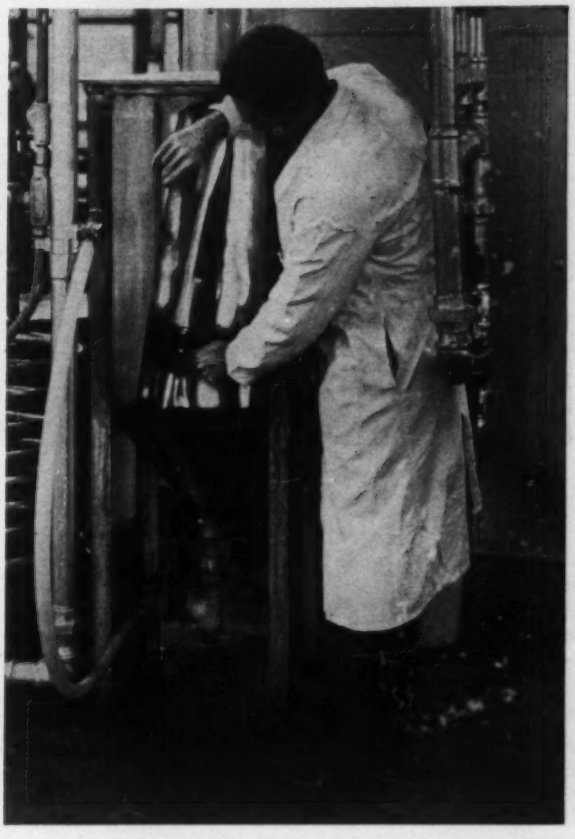
Initial contact adhesion is about 2 to 4 lb per inch. Depending on the surface, strength buildup is about 60 to 75 per cent or more during the first three days. Fasson describes the material as a high tack, aggressive, permanent type, pressure sensitive adhesive.

It's effective from −50 to 300° F. Shelf life is conservatively estimated at about two years. The adhesive side is protected by a special silicone release paper. The exterior surface of the stainless can also be furnished with a protective, adhesive paper to eliminate scratching and marring.

The bond resists greases, oils, acids, and alkalies. Water and moisture resistance is reported to be excellent. Maximum foil width is 16 in. Smaller widths and die cut shapes can be easily supplied. Different patterns can be embossed in the foil for decorative purposes. The work to date has been with 302 stainless. Other types will also be available.

Foil covers building panels . . .

Protects against corrosion . . .



. . . And trims such things as appliances

Big Shovel Proves Importance of Design

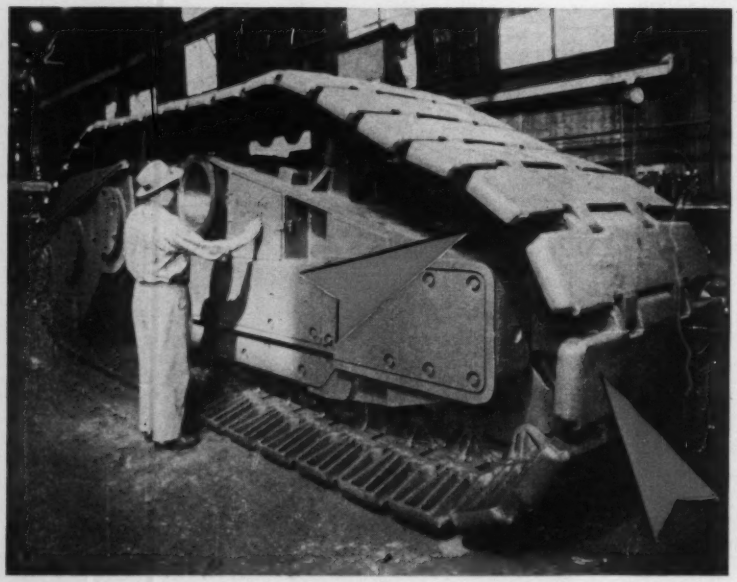
CASTINGS, forgings, and weldments may all be involved in building a single piece of heavy equipment. Proper selection of fabrication methods and materials is vital in the design stage.

Case in point: Designing giant power shovels for strip mining.

"Impact loadings, vibrations, temperature changes, and operating stresses must be carefully analyzed," says Ellis C. Wilson, project engineer, Marion Power Shovel Co., a division of Universal Marion Corp., Marion, Ohio, in information developed for the Steel Founders' Society of America, Cleveland. "Then metal parts must be chosen for top performance in every application."

A wide range of steels is put to work in the construction of machines like the "Mountaineer," operated near Cadiz, Ohio, by M. H. Hanna Co.

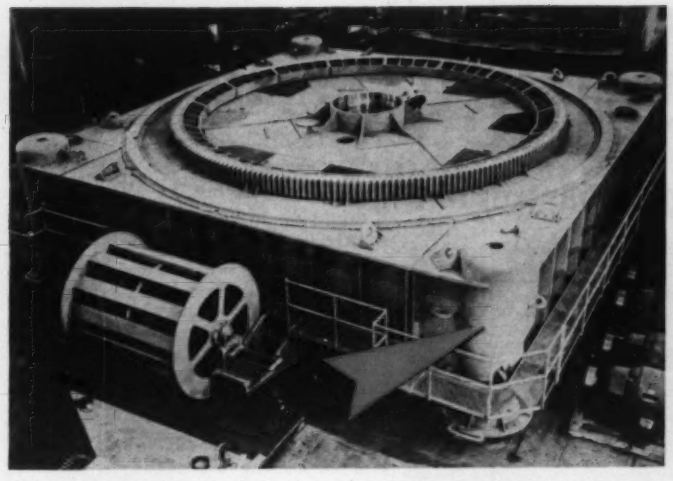
1 Casting



• Each part of the shovel must have a high strength-weight ratio. That is particularly true of the "front end" equipment, such as the boom, dipper, and associated parts.

The machine used at Cadiz removes overburden from coal seams with a 60 cu yd dipper, mounted on a 150 ft boom. Recently, a similar machine, with a 65 cu yd dipper and a 170 ft boom, was put into operation near Evansville, Ind., by Peabody Coal Co.

A typical shovel is expected to pile overburden up to 106 ft at a



2 Forging

3 Welding

158 ft radius. It can exert a dipper bail pull of 250 to 300 tons. It must complete an operating cycle in less than 1 minute. It must be self-propelled, capable of moving up a 15 per cent slope. And bearing pressure of the crawlers has to be less than 60 psi.

Swing speed of the shovel is limited by the weight of components on or attached to the upper (revolving) frame, and the distance of those parts from the center line of rotation. Stability of the revolving portion of the machine is affected by the size of the roller circle, and location of the center line of gravity. Weight of the front end equipment—dipper, bail, sheave block, dipper handle, crowd handle, stiff leg, and boom—must be kept at a minimum to permit the greatest possible payloads.

• Many parts of the shovel, including the lower frame and the revolving frame, are fabricated from heavy steel plates—high strength steel is chosen for critical applications.

Carbon steel plates are welded together to make the lower frame. Several subassemblies are shipped to the assembly site, where locating pins insure accurate alignment. The subassemblies are welded together.

The lower frame and the steering saddles that secure it to the crawler units are fabricated from low carbon, steel plates and castings.

The gantry above the shovel cab is made of low carbon, heavy section structurals, because its weight is on the center line of rotation and doesn't affect machine stability.

Low alloy, high strength steel plates are formed to make corner chords for the boom; steel pipe is used for lacing. Low alloy, high tensile steel plates are used in the dipper and dipper handle. High strength steel and welded construction are employed on the stiff leg and crowd handle. Racking on the crowd handle is made of high tensile steel plates (in segments) with machine cut teeth.

• Castings are used for many of the components, to reduce fabricating costs or to provide added strength at critical points.

On the latest machine, the boom foot anchor, which takes shock loads during digging and swinging, is made as a casting, with extra strength built into areas where cracks might start. The shovel hasn't been in service long enough for complete evaluation of the part.

The structure at the rotating center line of the revolving frame is made in the foundry, to cut down fabricating costs. The part weighs about 12 tons.

Roller rail circles on the upper and lower frames permit the upper frame to rotate. Circle segments are cast of Type 4340 steel, normalized, drawn, rough machined, heat treated to a high Brinell, and finish machined. Segments of the main rotating gear are cast of a modified, Type 8630 steel, then machine finished.

Each of the four crawler truck axles is made as three castings, assembled, and secured by welding. Castings are used for crawler gears and shoes. Hoist gears and sheaves are also made in the foundry.

Pistons for the machine's hydraulic leveling jacks are cast of a Meehanite iron.

The company is considering fabrication of the shovel dipper from steel sections cast to required contours.

• Forgings are used for jack cylinders, hoist pinions, and for rollers.

Corner jack cylinders, welded into the main frame, are forgings that contain manganese, vanadium, and about 0.25 per cent carbon. Rough weight of each cylinder: About 23,000 lb. Final machining is done after the cylinder has been welded into a corner section of the main frame.

The cylinders were originally one piece forgings, but now they are being purchased as two forgings welded together by the vender.

Hoist pinions are forgings, with machined, herringbone teeth. Forgings are also used for the conical rollers between the main and revolving frames, and for the crawler support rollers.

What Would

75% PAINT SAVINGS

Mean in YOUR Finishing Department?

Designed for the New Decade—Beautifully styled BAL HARBOUR line of aluminum furniture by AFCO was winner of the 1960 Apollo Award for pre-eminence in design. The uniform, high quality finish is applied electrostatically with the Ransburg No. 2 Process Hand Gun.

Faster . . . Cleaner . . . Cheaper—The "wrap-around" feature of the No. 2 Process Electrostatic Hand Gun paints all areas of this type of work from one side only, providing a 75% paint savings and a 700% increase in production volume over former air hand spray.

RANSBURG

Ransburg No. 2 Process Electrostatic Hand Guns are providing a 75% paint savings in the painting of beautiful AFCO aluminum furniture.

AFCO Aluminum Furniture Co., Inc., Miami, Fla., replaced hand spray with two Ransburg Electrostatic Hand Guns. Along with paint and labor savings, quality of the work was improved with greater uniformity. And, production volume was increased a healthy 700%! Formerly, they were painting approximately 100 items a day. NOW, with the faster, cleaner Electrostatic Hand Guns, they paint from 700 to 800 pieces per day. Electrostatic is faster because the "wrap-around" characteristic of Electro-Spray paints all areas of this type of work with a pass from one side only.

NO REASON WHY YOU CAN'T DO IT TOO

Write for information and literature about this revolutionary, new painting tool. See how the Ransburg Electrostatic Hand Gun can save time . . . paint . . . and cut costs in YOUR finishing department. If your production justifies, it'll pay you to investigate Ransburg's *automatic* electrostatic spray painting equipment. Write for our No. 2 Process brochures which show numerous examples of modern production painting in both large and small plants.

RANSBURG Electro-Coating Corp.

Box 23122, Indianapolis 23, Indiana

Columbium Forgings Weigh Over ½ Ton

OUTSIZED columbium alloy forgings weighing up to 1300 lb are being turned out by Wyman-Gordon Co., North Grafton, Mass.

It is the firm's latest bid for an increasingly important market: Forgings for tomorrow's hotter jets.

Example: One forging (about 1100 lb) will be employed in an unspecified, highly classified military project, says Wyman-Gordon.

• **Forging Requires Care** — The large forging was made on the 50,000 ton Air Force press at the North Grafton plant. The columbium, 1 per cent zirconium alloy is the lightest known metal that operates at 1700 to 2000° F.

The ingot weighed 1300 lb, was 15 in. in diameter, 26 in. long. Material was supplied by Wah Chang Corp., Medford, Oreg. It employed duplex, vacuum, consumable electrode melting of electron beam melted material.

Columbium, which melts above 4300° F, is extremely stiff to work at a forging temperature of 2100 to 2250° F. In working the alloy, operators describe handling characteristics as "ductile but stiff."

• **Coatings Are Necessary** — For protection against atmospheric contamination, the ingot and blocker forgings were coated with a ceramic. Development of such coatings is given a high priority.

Inspector checks cast of die used to produce huge columbium forging

Unit Punches Webs and Flanges of Beams

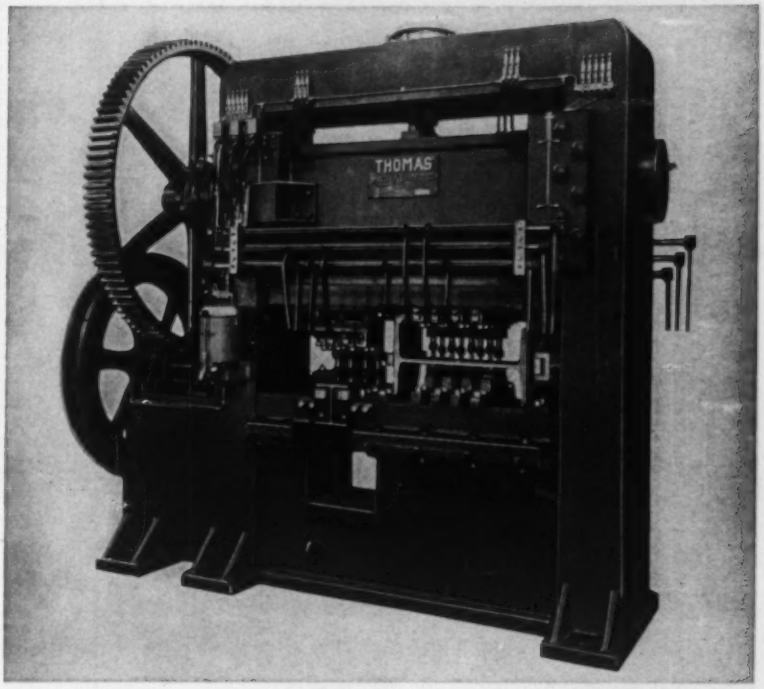
A LINE of steel, closed frame, multiple punches that can be used for web and flange punching of beams 3 to 36 in. WF can also accommodate angles, channels, tees, and wide plate punching. Capacities offered: 150 to 225 and 300 tons.

Standard machines are furnished with a single line of punching tools, but they may be arranged for double line if desired.

The compact design of the units features welded steel construction, air-electric clutch operation, air counterbalance, antifriction bearings, Formica ram guides, and Ductile iron gears. Centralized lubrication and multilever gag controls are optional.

Maximum production efficiency is obtained by using the punching machines with Thomas spacing tables, says the company.

For further information, *write* Thomas Machine Mfg. Co., Pittsburgh 23, Pa.

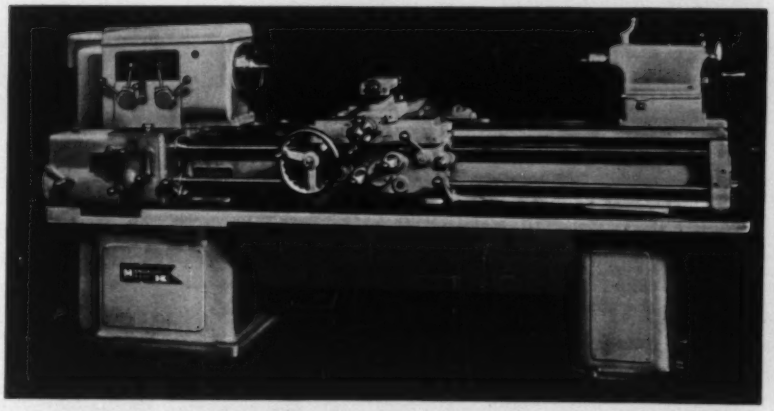


Lathe Turns, Bores, Faces, Does Thread Chasing

A LOW cost machine for conventional turning, boring, facing, and thread chasing operations has been developed by Monarch. The lathe can also be used for tracer turning (when combined with the Monarch Air-Tracer Pak).

The unit (Model K) has a swing over the bed of 16 in., a 10 in. swing over the cross slide, and a center distance of 54 in. The bed is a heavy ribbed, superalloy casting with four flame hardened and precision ground ways. There are 16 geared speeds in a range of 28 to 1200 rpm. The sturdy headstock features heat treated and accurately finished helical gears for smooth, quiet power transmission.

Precision type, tapered roller bearings support the spindle (it has a 6 in. D-1 hardened camlock nose). Headstock lubrication is automatic. The 5 hp main drive motor is mounted inside the cabinet leg. Drive to the spindle is through balanced, multiple V-belts.



All U. S. standard and U. S. fine threads are included in the 48 thread range. Feeds per revolution range from 0.0012 to 0.070 in. The end gear train is arranged to accept compound gearing for chas-

(*Please turn to Page* 76)

Reversing Ram Makes Die Changes Easy

This ruggedly built press is an operator's delight. It is provided with a reversing ram drive which permits backing the ram or upper die away from the work at any point in the stroke.

Since parts are produced in small quantities on this press, the dies and machine settings usually must be changed many times during a day. The reversing ram and other fine features make this work easy and fast for the operators.

This press is rated at ½" x 14'-0" mild steel but will bend plate to 18'-6" long that can clear the 18" deep throat.

No Other Shear Has So Many Important Features

Operators in hundreds of plants all over the country have acclaimed the ease of operation of Steelweld Shears. They like them because they have features that ease their work and make for accuracy. Steelweld is the **only** pivoted-blade shear on the market. No other shear has the wonderful MICRO-SET knife adjustment. Every Steelweld Shear is provided with fatigue-reducing electric foot switch control as standard equipment.

This shear is rated at 10' x 1".

Inquiries Invited for:

- Shears
- Bending Presses
- Single-Point Presses
- Two-Point Presses
- Four-Point Presses

Single and double action types

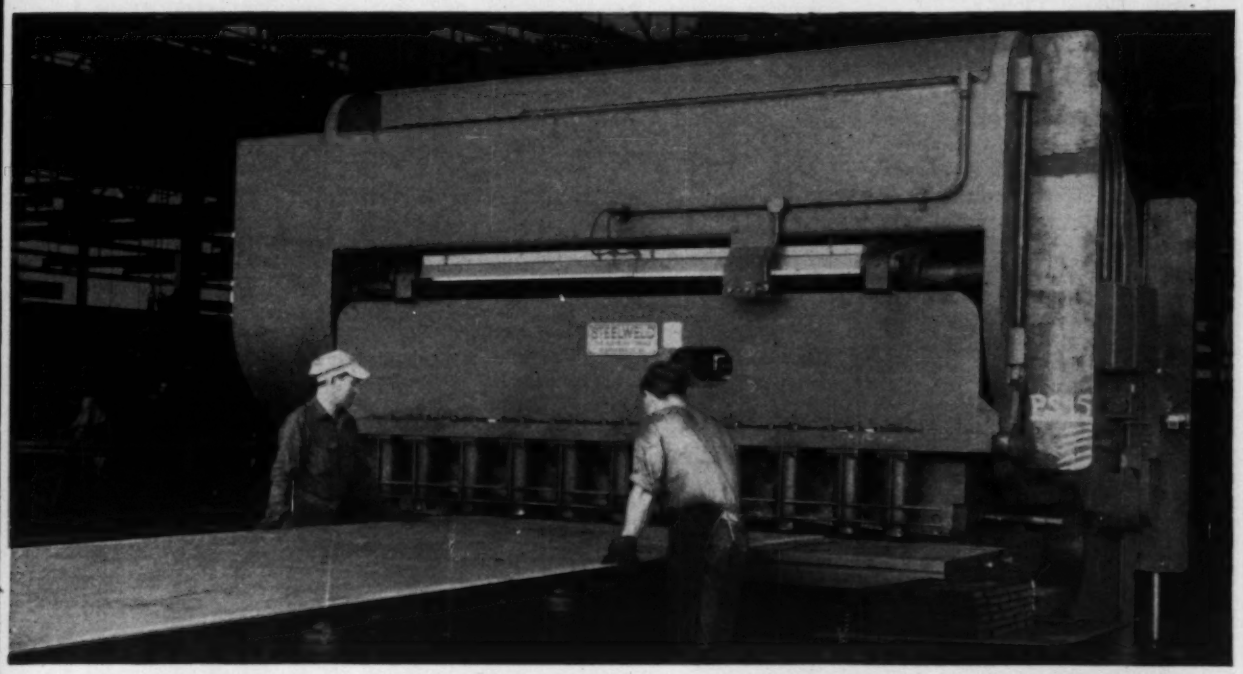
- Air Cushions

Operators LIKE STEELWELD MACHINES

THE MAN who operates a machine day in and day out usually gets to know it pretty well. If he has worked on various make machines, he is in a position to compare. He knows the good as well as the weak points. He can tell you what machines make his job easiest, what produce the most, what require the least maintenance. We have great respect for the operators and listen to what they say.

What we have been hearing about Steelwelds has elated us greatly. Briefly it is this: The operators have high regard for Steelwelds. They like their ease of operation which leaves them fresher at the end of the day. They approve the various adjustments with which Steelwelds are equipped and the simplicity of making them. They applaud the fact that the machines will operate continuously for long periods without need of attention.

The combination of the above factors, namely: Ease of operation, high production, excellent performance, and low maintenance, is hard to beat and accounts for the ever increasing popularity of Steelweld Presses and Shears.



GET THESE BOOKS!

Catalogs No. 1010 (Presses) and No. 1011 (Shears) give construction and engineering details. Profusely illustrated. Sent free.

THE CLEVELAND CRANE & ENGINEERING CO.

7858 EAST 281st STREET • WICKLIFFE, OHIO

STEELWELD

PRESSES and SHEARS

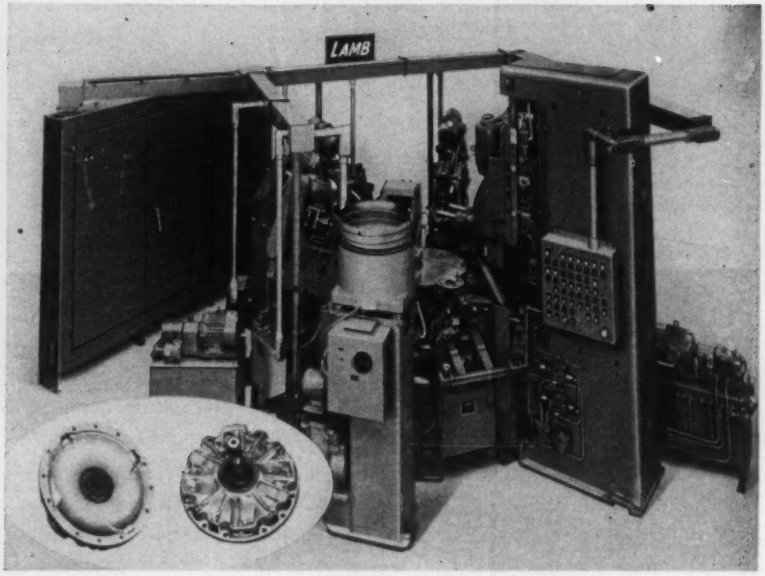
(*Continued from Page 73*)

ing odd leads. Gearbox lubrication is centralized.

Longitudinal and cross feeds are through large, cone type, friction clutches. Apron worm drive to hardened rack pinion helps assure smooth, uniform carriage feed. A precision lead screw (used only for threading) is mounted in antifriction thrust bearings. An automatic system supplies metered oil to apron parts, carriage bearing on the bed, and compound rest bottom slide bearing on the carriage.

Accessories include taper attachment, rests, and stops. They're available from stock.

For further information, *write* Monarch Machine Tool Co., 1947 Oak Ave., Sidney, Ohio.



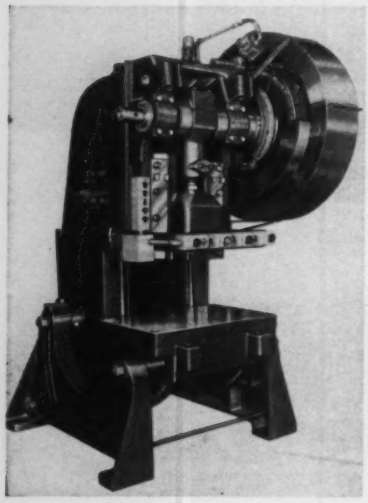
A TEN STATION, DIAL INDEX MACHINE utilizes tilting quill units with integral bushing plates in processing 212 transmission cover torus assemblies an hour. Operations include: Press in bushing, drill, spotface, reposition, and straddle mill. Standard building blocks are mounted around a standard, 48 in., cam actuated, indexing table. Hydraulic and electric components meet JIC standards. For further information, **write** F. Jos. Lamb Co., 5663 E. Nine Mile Rd., Detroit 34, Mich.

70 Ton Press Increases Die Life by 50 Per Cent

MAXIMUM RAM rigidity with less deflection is designed into the Model 70 Press-Rite power press, says the manufacturer. The 70 ton unit features high tensile, semisteel frames with exclusive tierods built in for longer die life. It's set up to handle large and small jobs easily and quickly.

Binding and misalignment of dies during heavy blanking and drawing operations are reduced to a minimum.

The company estimates that die life is increased up to 50 per cent over conventional, open backed, inclinable presses.



A nonrepeat, single stroke, safety mechanism helps to increase press operator efficiency and an automatic, cam actuated brake permits instant braking at the top of the stroke without continuous drag. The model is also available in Airflex air friction clutch with air applied brake and back geared models. The new Havir automatic feed is available on the unit.

For further information, *write* Havir Mfg. Co., 444 Cleveland Ave., St. Paul, Minn.

Nickel Alloy Introduced

AN ALLOY called Raonel has been announced by Rolled Alloys Inc. It contains 72 per cent minimum nickel and 14 to 17 per cent chromium.

The material conforms to AMS 5665 and 5540; ASTM B-168-49-T and 166-49-T; MIL-N-6710 (−2), 6840 (−1), and 15721-A Class C; and other applicable specifications.

All forms have been produced in the hot rolled, annealed, and pickled finish. Cold finished bars and sheets for aircraft are being considered.

For further information, *write* Rolled Alloys Inc., 5309 Concord Ave., Detroit 11, Mich.

Weigh Feeder Designed for Small Plastic Molders

SMALL CAPACITY, plastic injection, molding machines can be used with the compact, precision, weigh feeder made by Exact.

It's designed for mounting on the molding press in place of the regular volumetric hopper. The feeder will automatically weigh and deliver plastic charges to the press. The maker says the technique helps save material, improves quality of the molded parts, reduces cycle time, and minimizes rejects.

The setup has a precision scale with an over and under indicator; a 50 lb capacity, spun aluminum, supply hopper; a stainless steel, net weight hopper; and a dump mecha-

nism. The unit is operated by electricity and requires no compressed air.

Hinged plastic sides enclose the weighing mechanism to provide easy access, a clear view of the scale and mechanism, and to prevent contamination.

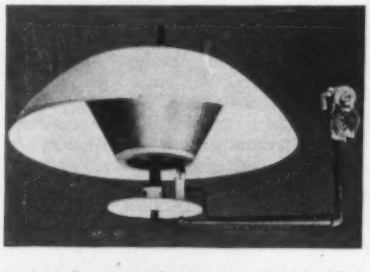
For further information, *write* Exact Weight Scale Co., 541 E. Town St., Columbus 15, Ohio.

Overhead Gas Units Emit Infrared Heat

OVERHEAD heaters (Space-Ray) beam infrared rays down in a wide, even circular pattern to warm men, floors, machinery, and tools.

They're suited to heat high ceiling industrial and commercial buildings and the units can also be used as zoned or spot heat in large buildings.

The units operate on natural or LP gas and come with a self-energizing thermostat for automatic operation. The stainless steel cone shaped emitter provides maximum wide angle heat distribution. The polished reflector directs stray radiation downward.



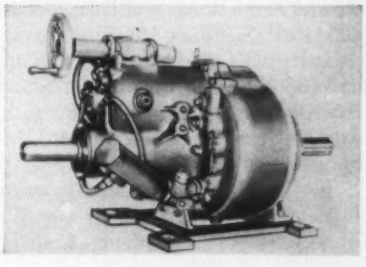
No fans or blowers are used. The units come in the 35,100 Btu size and are AGA approved.

For further information, *write* Space-Ray Corp., P. O. Box 3485, Charlotte 3, N. C.

Hydraulic Transmission Has Speeds to 1600 rpm

A 10 HP, variable speed, hydraulic transmission is suited for continuous duty. It provides infinitely variable speeds from 0 to 1600 rpm for high torque, heavy duty applications such as machine tool drives, conveyors, winches, lifts, and spring coilers.

It's set up for operation with any 2 to 10 hp motor or 20 hp gas engine. Precise speed selection is obtained by rotation of a handwheel. Speed is smooth and constant. Controls are easily altered for remote control.



Ball and roller bearings are used. It's 22 in. long (excluding shafts), 13 in. wide, 16 in. high, and weighs 100 lb. Inputshaft is 1⅜ in. in diameter; outputshaft is 1⅝ in. Shaft lengths: 4 in.

For further information, *write* Roberts Electric Co., 849 W. Grand Ave., Chicago 22, Ill.

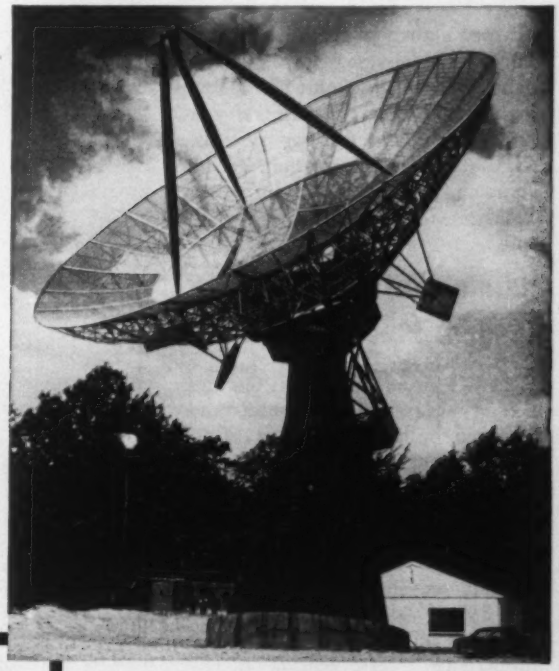
Dock Leveling Device Carries Up to 10 Tons

"DIMENSIONAL action" is how the maker describes the movements of a dock leveling device. The unit not only raises and lowers, but also extends and retracts.

The company states that the principal advantage is low space consumption and more flexible use in restricted areas. Trucks to be loaded or unloaded can be serviced even when perfect positioning is impossible. Since the platform of the leveler can be retracted behind the dock face or extended 20 in. forward, the unit is suited to loading and unloading of railroad cars as well as for truck dock operation. Safety skirts are standard equipment.

When the platform is level with the dock floor and even with the dock face, it consumes no functional space and will support normal cross traffic up to 10 tons. The hydraulic cylinder and over-all assembly will also support that weight during operational use (even

One rpm per day



CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

It takes real accuracy in gearing to turn an 84-ft. radio telescope at that speed. Backlash on the Cone-Drive **double-enveloping worm** gear set used in the complex drive system was held to 0.0012-inch.

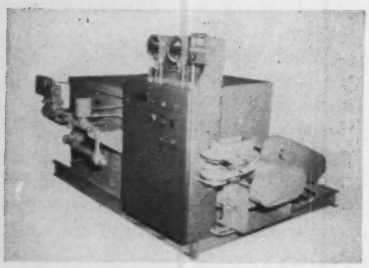
Dependable Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

if the lip is not supported by the vehicle loading bed).

For further information, *write* Wayne Pump Co., a division of Symington-Wayne Corp., Griffin Street, Ft. Wayne, Ind.

Ratings Up to 3 Million Btu Provided in Heaters

A LINE of heaters for heat treating, finishing, and other processes is set up for gas, oil, or electricity and is rated from 150,000 to 3 million Btu and 8 to 360 kw.



The line provides up to 900° F delivered air when gas or oil is used, and 550° F delivered air with electricity. The units are available singly for custom systems or you can get complete package systems.

For further information, *write* Despatch Oven Co., 619 S. E. Eighth St., Minneapolis, Minn.

Pulling Power Boosted on Rugged, Precise Roll Feed

A PRECISION roll feed features feeding accuracy, ruggedness, and increased pulling power. It incorporates a long life cam clutch which transmits greater torque with reduced wear and high repetitive accuracy.

The lower feed roller is 3⅞ in. in diameter and produces a nominal 3½ in. stock travel with less than one-third the full roller circumference. No gearing is employed in the series (eliminates backlash and improves over-all feed accuracy).

Roller pressure is adjustable and maintained by strong spring pressure. A brake (adjustable during operation) prevents coasting of the feed rollers. Other features include a roll lifter, needle bearings on rollers, a reversible clutch for feeding in either direction, stock guides, and an adjustable mounting bracket to bring rollers to correct die height. A bell crank is available as an accessory for the roll feed.

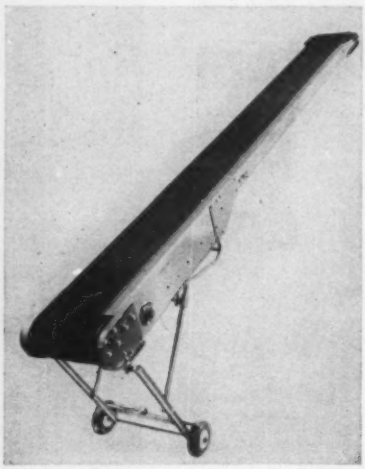
Two series are supplied (both in sizes having rollers to handle 3, 5, 7, and 9 in. stock widths). Series 3.5 PRF feeds up to 3½ in. in length with a feed accuracy of ±0.005 in. easily obtainable. Series 9 PRF feeds 0-9 in. per stroke with slightly less accuracy due to the longer feed length.

For further information, *write* Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif.

Portable Belt Conveyor Doesn't Need Lubrication

SEALED bearings in the Model A Handy Boy, portable belt conveyor, eliminate the greasing chore. The maker says tests show the new design will stand up to rugged work applications.

Reversible movement also is featured: The belt travels in either direction at 55 fpm.. Different speeds may be ordered.



The unit has a 10 in. belt on a 12 in. bed. Eight sizes (6 to 20 ft long) and accessories are available.

For further information, *write* Hytrol Conveyor Co., 1959 S. 54th St., Milwaukee, Wis.

NEW Literature

Write directly to the company for a copy

Plasma Spraying

Application of plasma spraying is discussed in a brochure. Subjects include high temperature protection, fabrication of parts and shapes of previously "unworkable materials," and the depositing of carbide hard facing. Plasma Systems Div., Schori Process Corp., P.O. Box 712, Port Washington, N. Y.

Plant Layout Kit

A 12 page pamphlet includes a layout kit containing 187 items—including mock-ups for machine tools, material handling equipment, and nonproduction equipment. It's said to be ideal for experimentation before tackling a large or complex plant layout. "Visual" Plant Layouts, 11 Pennsylvania Ave., Oakmont (Allegheny County), Pa.

Power Transmission

A 22 page catalog describes the application of a dual torque locking and positioning device (called Rev-Lok) to power transmission problems. Formsprag Co., 23601 Hoover Rd., Warren (Detroit), Mich.

Machining Aluminum

"Machining Kaiser Aluminum with Automatic Screw Machines," 104 pages, offers latest information on advances made in this important field. It includes technical data and tooling information. Technical Publications Dept., Kaiser Aluminum & Chemical Sales Inc., 300 Lakeside Dr., Oakland 12, Calif.

Zircaloy-4 Tubing

These data on Zircaloy-4 tubing are given in Special Analysis Memo No. 112: Chemical composition, impurity content, mechanical properties, physical properties, production limits, corrosion resistance, and hints on arcwelding, machining, and grinding. Superior Tube Co., 1585 Germantown Ave., Norristown, Pa.

Steam Heating Coils

A booklet, "Steam Heating Coils," includes application information on blast heating coils, distributing tube heating coils, and dual feed distributing tube coils. It has photographs, drawings, and contains sections on construction details, selection, performance, piping diagrams, and installation procedures. Specify catalog 1710. Dept. T-448, Sturtevant Div., Westinghouse Electric Corp., Hyde Park, Mass.

Investment Casting

An illustrated, comprehensive report on the characteristics, metallurgy, markets, and future trends of the U. S. investment casting industry is available in a 20 page booklet. WaiMet Alloys Co., a division of Howe Sound Co., 5320 Oakman Blvd., Dearborn, Mich.

1960: Above Par—Below Hopes

STEELMAKERS are ringing down the curtain on a better-than-average but disappointing year.

At the start of 1960, there were forecasts of record output. Estimates went as high as 140 million ingot tons—20 per cent above the previous peak (117 million in 1955).

Now, with less than a week to go, it looks like the year's production will be 99.3 million tons—only 6 million tons more than the industry melted in 1959—and it had a 166 day strike. Still, 1960's output will be sixth largest in the industry's history.

NEEDS OVERSTATED— At the start of the year, market analysts believed finished steel consumption would reach an all-time high of 85 million tons. They also believed that users might increase their inventories by 10 million tons.

Neither happened. Consumers used 75 million tons—just about the normal diet for a "good" year. They increased their inventories from January to May (adding about 7 million tons), but then they turned around and started to liquidate them. From May through December, they cut their stocks by 10 million tons—pushing them down to the lowest level in a decade.

WHAT WENT WRONG?— Steelmen attribute the year's lackluster performance to these factors:

1. A slow start. Instead of soaring, the economy had a hard time getting off the ground. The stock market's slump contributed to the general feeling of uneasiness—causing manufacturers and their customers to postpone spending.

2. Slumping demand from: Appliance makers—because of less spending for consumer durables, more for services; oil companies—because of tight controls on drilling; railroads—because of declining revenues; canmakers—because of bad weather, small food packs, and competition from glass, plastic, and aluminum containers; machinery builders—because of industrial overcapacity and shrinking profits.

3. Rigid inventory controls. Consumers saw how fast the steel industry could meet their needs after the strike and decided they could operate with smaller stocks.

IMPORTS DECLINED— Although industry experts guessed wrong about ingot output and finished steel consumption, they were on the right track a year ago when they sized up the import-export situation. STEEL (Jan. 4, p. 379) quoted them as saying: "Imports will probably decline to about 3.5 million tons (from the previous year's 4.4 million) . . . look for exports of about 3 million tons." Latest figures from the Commerce Department show imports through October of 2.97 million tons and a probable yearend total of 3.3 million. Exports, at 2.58 million tons through October, seem destined to hit the predicted 3 million.

FAVORABLE SIGNS— Although business is in a yearend slump—with some metalworking plants as well as mills shut down for the holidays—steelmakers are looking for better sales and shipments in January. Bookings for next month are 5 to 10 per cent better than December's. Items: 1. Demand for oil country goods is improving. (December was the best month since the first quarter for some producers.) 2. Service centers have nearly completed their inventory adjustments. 3. Canmakers have started issuing January and February releases for tin plate.

PRODUCTION SKIDS— Look for steelmaking operations to drop to the year's lowest level this week—40 per cent of capacity or less. Last week, furnaces were operated at 46.9 per cent of capacity, 1.8 percentage points below the previous week's revised rate. Output: About 1,335,000 ingot tons.

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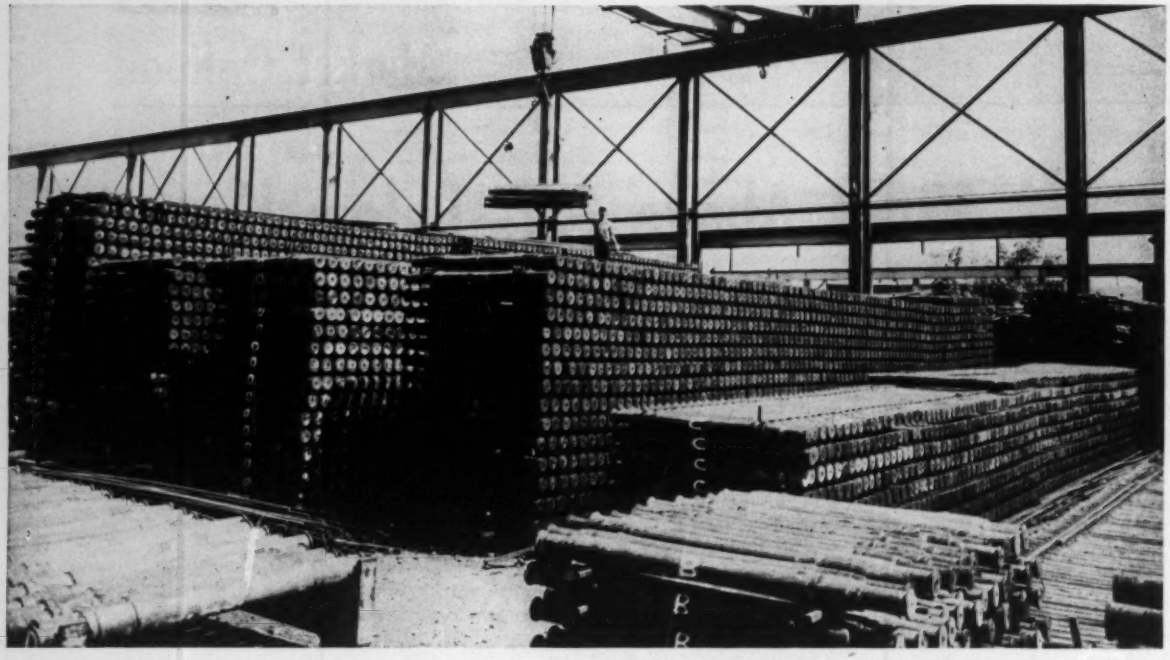


Axles from scrapped railroad cars . . .
stored in this classification yard after spark testing to determine carbon content

Carbon Control Gives Old Axles New Appeal

TIGHTER CONTROL of the carbon content in steel rerolled from railroad axles is making the product more attractive and useful to fabricators who buy medium carbon steel.

Rerolling mills produced about 71,000 tons of axle steel products in 1959. Concrete reinforcing bars head the list of products. But a great deal of tonnage is also rolled into merchant bars and light shapes.

Axle steel ranges from 0.37 to 0.55 per cent in carbon. (It is sometimes confused with rail steel which averages around 0.85 per cent carbon and sells at the same price.)

Sorting the axles into three carbon ranges is relatively new in the trade. Phoenix Mfg. Co., a division of Union Tank Car Co., Joliet, Ill., has built a classification yard and trained spark testers to separate the axles into carbon ranges of 0.37 to 0.44 per cent, 0.43 to 0.50 per cent, and 0.48 to 0.55 per cent. The ranges correspond to AISI C-1040, C-1045, and C-1050.

"Since we can offer axle steel in close carbon ranges and have better control of classification, we have only scratched the surface of the application of axle steel," asserts Ray Davenport, chief metallurgist at Phoenix.

• Special training was required to get capable spark testers.

Testing depends on visual examination of sparks from a grinding wheel. "There were no experienced spark testers available," explains Mr. Davenport, "so we hired a man who had been in the business about 30 years and had trained many men. The training brought good results."

Phoenix spark testers sort the axles prior to rolling and store them in the outside classification yard.

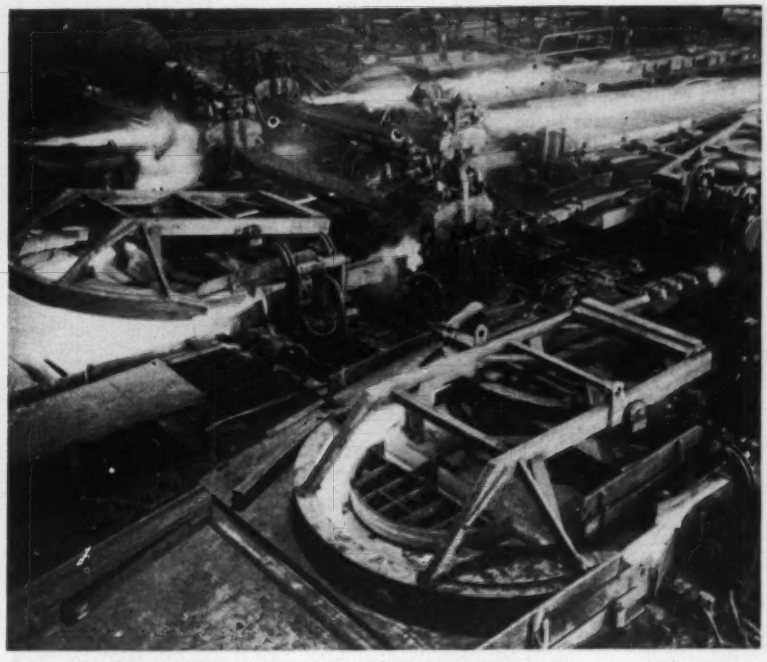
To make the scrapped axles into useful products, the company heats them to about 2250° F in a continuous reheating furnace, then rolls them into finished shapes on a cross-country mill. The rolling mill consists of a 20 x 72 in., three high, breakdown stand; two stands of 12 x 30 in. rolls; and four stands of 12 x 24 in. rolls.

In the mill, the axles become finished shapes such as flats, angles, channels, rounds, squares, special sections, and deformed concrete reinforcing bars.

• Railroad axles are a critical part of a railroad car and must be forged from axleshaft forging quality steel.

Mr. Davenport says axle steel offers excellent surface cleanliness.

Generally, tensile strength and



Are rolled in a crosscountry mill . . .

after heating in a continuous reheating furnace to about 2250° F

Into a variety of products for industry

where medium carbon steels can be applied. Shapes, reinforcing bar are examples

yield point are slightly lower than they are in the billet grades; but bending properties and ductility are correspondingly better. Reason: Axle steel has a manganese range of 0.40 to 0.90; the range for the corresponding new billet steel is 0.60 to 0.90. Since 1941, specifications of the Association of American Railroads have called for a silicon killed steel, 0.15 silicon minimum and 0.60 to 0.90 manganese content for all forged axles.

Axle steel can be welded just like billet steel in the same carbon ranges. Where the higher strength steels (0.35 to 0.55 carbon) are welded, low hydrogen electrodes should be used.

Axle steel generally isn't recommended for products requiring controlled heat treatment because of the spread of manganese and carbon. Simple heat treating requiring a minimum hardness has proved successful.

• Phoenix says axle steel can be used for many products where a medium carbon steel is specified.

Manufacturers in the transportation, power transmission, farm equipment, and construction industries are making extensive use of axle steel sections.

Automakers are using them for high strength supporting brackets, stabilizer clamps, and other parts. Railroad suppliers buy axle steel in round form to make gage rods used to space rails. The material is formed into bolts, brackets, insulator holders, guy rods, guy anchor bolts and pole line hardware.

Farm equipment manufacturers cut costs by using axle steel sections for cultivator and harrow teeth, high strength angles, tow bars, supporting bars, and many other applications.

Axle steel sections go into axles for boat and house trailers, bucket teeth for front loading trucks, and even lawn mower blades. One of the biggest uses is for deformed concrete reinforcing bars in roads, bridges, building, precast slabs, and other concrete products.

Axle steel rebars can meet either intermediate or hard grade specifications, and their internal soundness and ductility allow forming and bending into pretzel-like shapes without cracking or breaking.

Chicago's Steel Imports Increase During November

Steel imports into the port of Chicago via the St. Lawrence Seaway increased from 12,319 net tons in October to 15,378 tons in November, reports the Chicago Association of Commerce & Industry. The November total compares with 37,777 tons in the same month last year.

Through November this year, waterborne steel imports amounted to 80,793 tons, a 65 per cent decrease from the 228,037 tons imported in the comparable 1959 period.

Of the 15,378 tons imported in November, wire rods again topped the list, accounting for 46 per cent of the total. Structural steel was 19 per cent; wire and wire products 12; pipe and tubing 9.1; bars 6.9; barbed wire 3.7; nuts, bolts, screws and washers 3.6 per cent.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 85 & 86

Sheet demand still lags, but producers are anticipating a modest gain in orders over the next several weeks. Consumers' stocks are low, a factor that should stimulate buying. However, so long as mill deliveries remain easy, there's little prospect that consuming pressure will force much forward buying soon.

Prospects for early 1961 business are none too promising in some of the leading consuming lines, such as household appliances, metal shipping containers, and office furniture. Also, there's considerable uncertainty about automotive requirements for the next month or so.

Hot rolled sheets are available for delivery in two to three weeks—in some cases even better. Cold rolled sheet deliveries are running two to five weeks, depending upon what producers have in the way of bands. Galvanized sheet shipments range two to four weeks.

Steel Bars . . .

Bar Prices, Page 84

Because most consumers are trying to keep their inventories down until they've closed their books for the year, demand for cold finished bars is no better than it was a month ago. Much the same situation prevails with respect to hot bars.

Fastener manufacturers and some small manufacturing consumers in other lines have requested that some of the steel they originally ordered for December delivery be held up until January. Service centers are ordering sparingly because they're well stocked and their customer requirements have tapered off.

Despite the current adversity, bar producers aren't too depressed. Bookings for January are starting to build up—partly because of the tonnage deferred from December, and partly because of orders from customers who have cut their stocks as much as they dare. January shipments, in all probability, will be 5 to 10 per cent larger than December's.

Tin Plate . . .

Tin Plate Prices, Page 86

Although December has been the poorest month of the year for tin plate sales, the corner apparently has been turned. Producers are anticipating a small increase in shipments during January, followed by a substantial gain in February when canmakers start volume production of containers for the 1961 food pack.

Plates . . .

Plate Prices, Page 84

Enough platework is under negotiation to signal a pickup in ordering next month. That's especially true of specialties and alloy grades, reflecting more government, gas industry, and chemical industry requirements.

Most platemakers are anticipating no sharp improvement in demand before early spring when seasonal needs should quicken market activity.

Distributors . . .

Prices, Page 89

Holiday influences and bad weather in the East curtailed business at steel service centers. Bookings for the month will be below those for November in most districts.

Distributors look for some improvement in January, especially in plates, bars, and small shapes.

Inventory adjustment at the service centers has about run its course. Stocks are in good balance and in just about the over-all volume that is desired under present marketing conditions.

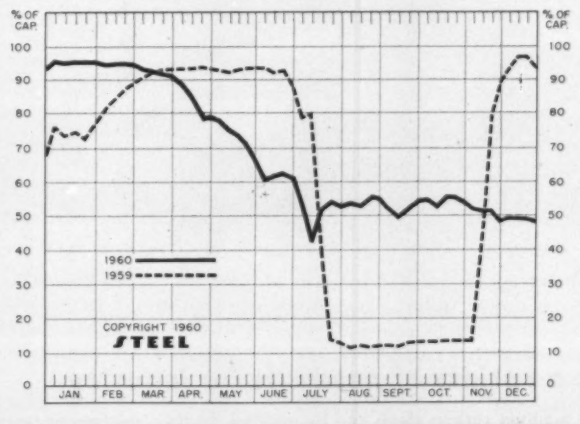
DISTRICT INGOT RATES

(Percentage of capacity utilized)

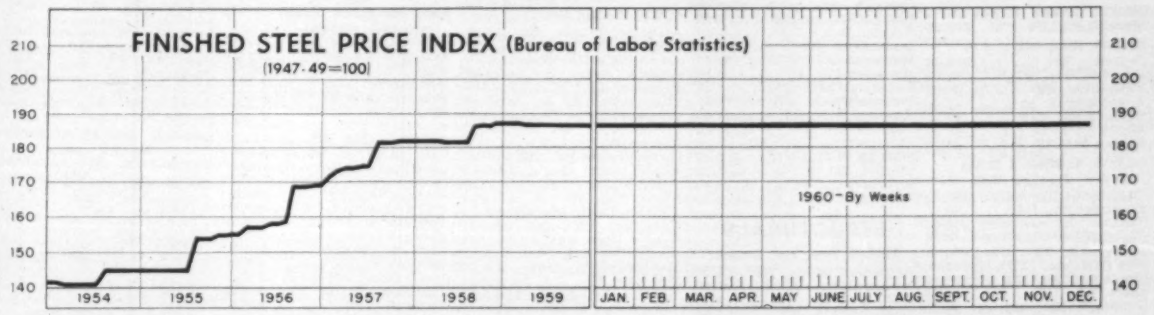
	Week Ended Dec. 25	Week Ago	Month Ago	Year Ago
Northeastern	45	49	47	98
Buffalo	40	41	49	98
Pittsburgh	43	47	46	96
Youngstown	36	37	27	87
Cleveland	40	44	54	94
Detroit	57	63	67	102
Chicago	52	53	53	96
Cincinnati	55	55	54	81
St. Louis	61	62	50	83
Southern	55	45	52	91
Western	50	53	46	90
Total Industry	46.9	48.7	48.0	93.3
Index (1947-49=100)	83.1	86.3	85.1	164.4
Net Tons (In thousands)	1,335	1,387	1,367	2,641

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Dec. 20, 1960	Week Ago	Month Ago	Nov. Index	Year Ago
186.2	186.2	186.2	186.2	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Dec. 20

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloys, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.489
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe, Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft.)	194.268
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.685
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.414
		Woven Wire Fence (20-rod roll)	21.008

STEEL's FINISHED STEEL PRICE INDEX

	Dec. 21 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	206.90
Index in cents per lb	6.713	6.713	6.713	6.713	5.659

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$127.95
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	29.00	28.67	28.83	41.33	50.67

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec. 21 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.97	5.97	5.97	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton	Dec. 21 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	62.18
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	62.68
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), ueld., Cin.	70 20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tonst	245.00	245.00	245.00	245.00	190.00

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$26.50	$26.50	$26.50	$41.50	$50.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	34.00	42.00	52.00
No. 1 Heavy Melt, Chicago	26.50	25.50	26.00	40.50	49.50
No. 1 Heavy Melt, Valley	26.50	26.50	26.50	43.50	52.50
No. 1 Heavy Melt, Cleve.	23.50	23.50	23.50	40.50	51.50
No. 1 Heavy Melt, Buffalo	23.50	23.50	23.50	37.50	45.50
Rails, Rerolling, Chicago	48.50	46.50	46.50	61.50	71.00
No. 1 Cast, Chicago	37.50	36.50	36.50	54.50	50.50

COKE, Net Ton					
Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	26.25

Steel Prices

Mill prices as reported to STEEL, Dec. 21, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 85; footnotes, page 87.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ..... $76.00

INGOTS, Alloy (NT)
Detroit S41 ..... $82.00
Economy,Pa. B14 ..... 82.00
Farrell,Pa. S3 ..... 82.00
Lowellville,O. S3 ..... 82.00
Midland,Pa. C18 ..... 82.00
Munhall,Pa. U5 ..... 82.00
Sharon,Pa. S3 ..... 82.00

BILLETS, BLOOMS & SLABS Carbon Rerolling (NT)
Bartonville,Ill. K4 ..... $82.00
Bessemer,Pa. U5 ..... 80.00
Buffalo R2 ..... 80.00
Clairton,Pa. U5 ..... 80.00
Ensley,Ala. T2 ..... 80.00
Fairfield,Ala. T2 ..... 80.00
Fontana,Calif. K1 ..... 90.50
Gary,Ind. U5 ..... 80.00
Johnstown,Pa. B2 ..... 80.00
Lackawanna,N.Y. B2 ..... 80.00
Munhall,Pa. U5 ..... 80.00
Owensboro,Ky. G8 ..... 80.00
S.Chicago,Ill. R2, U5 ..... 80.00
S.Duquesne,Pa. U5 ..... 80.00
Sterling,Ill. N15 ..... 80.00
Youngstown R2 ..... 80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ..... $99.50
Buffalo R2 ..... 99.50
Canton,O. R2 ..... 102.00
Clairton,Pa. U5 ..... 99.50
Conshohocken,Pa. A3 ..... 104.50
Ensley,Ala. T2 ..... 99.50
Fairfield,Ala. T2 ..... 99.50
Farrell,Pa. S3 ..... 99.50
Fontana,Calif. K1 ..... 109.00
Gary,Ind. U5 ..... 99.50
Geneva,Utah C11 ..... 99.50
Houston S5 ..... 104.50
Johnstown,Pa. B2 ..... 99.50
Lackawanna,N.Y. B2 ..... 99.50
LosAngeles B3 ..... 109.00
Midland,Pa. C18 ..... 99.50
Munhall,Pa. U5 ..... 99.50
Owensboro,Ky. G8 ..... 99.50
Seattle B3 ..... 109.00
Sharon,Pa. S3 ..... 99.50
S.Chicago R2, U5, W14 ..... 99.50
S.Duquesne,Pa. U5 ..... 99.50
S.SanFrancisco B3 ..... 109.00
Warren,O. C17 ..... 99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..... $119.00
Bridgeport,Conn. C32 ..... 119.00
Buffalo R2 ..... 119.00
Canton,O. R2, T7 ..... 119.00
Conshohocken,Pa. A3 ..... 126.00
Detroit S41 ..... 119.00
Economy,Pa. B14 ..... 119.00
Farrell,Pa. S3 ..... 119.00
Fontana,Calif. K1 ..... 140.00
Gary,Ind. U5 ..... 119.00
Houston S5 ..... 124.00
Ind.Harbor,Ind. Y1 ..... 119.00
Johnstown,Pa. B2 ..... 119.00
Lackawanna,N.Y. B2 ..... 119.00
LosAngeles B3 ..... 139.00
Lowellville,O. S3 ..... 119.00
Massillon,O. R2 ..... 119.00
Midland,Pa. C18 ..... 119.00
Munhall,Pa. U5 ..... 119.00
Owensboro,Ky. G8 ..... 119.00
Seattle(6) B3 ..... 140.00
Sharon,Pa. S3 ..... 119.00
S.Chicago R2,U5,W14 ..... 119.00
S.Duquesne,Pa. U5 ..... 119.00
Struthers,O. Y1 ..... 119.00
Warren,O. C17 ..... 119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ..... $122.50
Canton,O. R2 ..... 125.00
Cleveland R2 ..... 122.50
Gary,Ind. U5 ..... 122.50
S.Chicago,Ill. R2,W14 ..... 122.50
S.Duquesne,Pa. U5 ..... 122.50
Warren,O. C17 ..... 122.50

SKELP
Aliquippa,Pa. J5 ..... 5.05
Benwood,W.Va. W10 ..... 5.05
Ind.Harbor,Ind. Y1 ..... 5.05
Munhall,Pa. U5 ..... 5.05
Pittsburgh J5 ..... 5.05
Warren,O. R2 ..... 5.05
Youngstown R2, U5 ..... 5.05

WIRE RODS
AlabamaCity,Ala. R2 ..... 6.40
Aliquippa,Pa. J5 ..... 6.40
Alton,Ill. L1 ..... 6.60
Bartonville,Ill. K4 ..... 6.50
Buffalo W12 ..... 6.40
Cleveland A7 ..... 6.40
Donora,Pa. A7 ..... 6.40
Fairfield,Ala. T2 ..... 6.40
Houston S5 ..... 6.65
IndianaHarbor,Ind. Y1 ..... 6.40
Johnstown,Pa. B2 ..... 6.40
Joliet,Ill. A7 ..... 6.40
KansasCity,Mo. S5 ..... 6.65
Kokomo,Ind. C16 ..... 6.50
LosAngeles B3 ..... 7.20
Minnequa,Colo. C10 ..... 6.65
Monessen,Pa. P7 ..... 6.40
Pittsburg,Calif. C11 ..... 7.20
Portsmouth,O. P12 ..... 6.40
Roebling,N.J. R5 ..... 6.50
S.Chicago,Ill. R2, W14 ..... 6.40
SparrowsPoint,Md. B2 ..... 6.50
Sterling,Ill.(1) N15 ..... 6.40
Sterling,Ill. N15 ..... 6.50
Struthers,O. Y1 ..... 6.40
Worcester,Mass. A7 ..... 6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ..... 5.50
Aliquippa,Pa. J5 ..... 5.50
Atlanta A11 ..... 5.70
Bessemer,Ala. T2 ..... 5.50
Bethlehem,Pa. B2 ..... 5.55
Birmingham C15 ..... 5.50
Clairton,Pa. U5 ..... 5.50
Fairfield,Ala. T2 ..... 5.50
Fontana,Calif. K1 ..... 6.30
Gary,Ind. U5 ..... 5.50
Geneva,Utah C11 ..... 5.50
Houston S5 ..... 5.60
Ind.Harbor,Ind. I-2, Y1 ..... 5.50
Johnstown,Pa. B2 ..... 5.55
Joliet,Ill. P22 ..... 5.50
KansasCity,Mo. S5 ..... 5.60
Lackawanna,N.Y. B2 ..... 5.55
LosAngeles B3 ..... 6.20
Minnequa,Colo. C10 ..... 5.80
Munhall,Pa. U5 ..... 5.50
Niles,Calif. P1 ..... 6.25
Phoenixville,Pa. P4 ..... 5.55
Portland,Oreg. O4 ..... 6.25
Seattle B3 ..... 6.25
S.Chicago,Ill. U5, W14 ..... 5.50
S.SanFrancisco B3 ..... 6.15
Sterling,Ill. N15 ..... 5.50
Torrance,Calif. C11 ..... 6.20
Weirton,W.Va. W6 ..... 5.50

Wide Flange
Bethlehem,Pa. B2 ..... 5.55
Clairton,Pa. U5 ..... 5.50
Fontana,Calif. K1 ..... 6.45
IndianaHarbor,Ind. I-2 ..... 5.50
Lackawanna,N.Y. B2 ..... 5.55
Munhall,Pa. U5 ..... 5.50
Phoenixville,Pa. P4 ..... 5.55
S.Chicago,Ill. U5 ..... 5.50
Sterling,Ill. N15 ..... 5:50
Weirton,W.Va. W6 ..... 5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 6.90
Munhall,Pa. U5 ..... 6.80
S.Chicago,Ill. U5, W14 ..... 6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ..... 8.05
Bessemer,Ala. T2 ..... 8.05
Bethlehem,Pa. B2 ..... 8.10
Clairton,Pa. U5 ..... 8.05
Fairfield,Ala. T2 ..... 8.05
Fontana,Calif. K1 ..... 8.85
Gary,Ind. U5 ..... 8.05
Geneva,Utah C11 ..... 8.05
Houston S5 ..... 8.15
Ind.Harbor,Ind. I-2, Y1 ..... 8.05
Johnstown,Pa. B2 ..... 8.10
KansasCity,Mo. S5 ..... 8.15
Lackawanna,N.Y. B2 ..... 8.10
LosAngeles B3 ..... 8.75
Munhall,Pa. U5 ..... 8.05
Seattle B3 ..... 8.80
S.Chicago,Ill. U5, W14 ..... 8.05
S.SanFrancisco B3 ..... 8.70
Sterling,Ill. N15 ..... 7.75
Struthers,O. Y1 ..... 8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ..... 8.10
Ind.Harbor,Ind. I-2 ..... 8.05
Lackawanna,N.Y. B2 ..... 8.10
Munhall,Pa. U5 ..... 8.05
S.Chicago,Ill. U5 ..... 8.05
Sterling,Ill. N15 ..... 7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ..... 5.55
Ind.Harbor,Ind. I-2 ..... 5.50
Lackawanna,N.Y. B2 ..... 5.55
Munhall,Pa. U5 ..... 5.50
S.Chicago,Ill. I-2, U5 ..... 5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ..... 6.50
Lackawanna,N.Y. B2 ..... 6.50
Munhall,Pa. U5 ..... 6.50
S.Chicago,Ill. I-2, U5 ..... 6.50
Weirton,W.Va. W6 ..... 6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..... 5.30
Aliquippa,Pa. J5 ..... 5.30
Ashland,Ky.(15) A10 ..... 5.30
Atlanta A11 ..... 5.50
Bessemer,Ala. T2 ..... 5.30
Clairton,Pa. U5 ..... 5.30
Claymont,Del. P4 ..... 5.30
Cleveland J5, R2 ..... 5.30
Coatesville,Pa. L7 ..... 5.30
Conshohocken,Pa. A3 ..... 5.30
Ecorse,Mich. G5 ..... 5.30
Fairfield,Ala. T2 ..... 5.30
Farrell,Pa. S3 ..... 5.30
Fontana,Calif.(30) K1 ..... 6.10
Gary,Ind. U5 ..... 5.30
Geneva,Utah C11 ..... 5.30
GraniteCity,Ill. G4 ..... 5.40
Harrisburg,Pa. P4 ..... 5.30
Houston S5 ..... 5.40
Ind.Harbor,Ind. I-2, Y1 ..... 5.30
Johnstown,Pa. B2 ..... 5.30
Lackawanna,N.Y. B2 ..... 5.30
Mansfield,O. E6 ..... 5.30
Minnequa,Colo. C10 ..... 6.15
Munhall,Pa. U5 ..... 5.30
Newport,Ky. A2 ..... 5.30
Pittsburgh J5 ..... 5.30
Riverdale,Ill. A1 ..... 5.30
Seattle B3 ..... 6.20
Sharon,Pa. S3 ..... 5.30
S.Chicago,Ill. U5, W14 ..... 5.30
SparrowsPoint,Md. B2 ..... 5.30
Sterling,Ill. N15 ..... 5.30
Steubenville,O. W10 ..... 5.30
Warren,O. R2 ..... 5.30
Youngstown U5, Y1 ..... 5.30
Youngstown(27) R2 ..... 5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 ..... 7.05
Fontana,Calif. K1 ..... 7.85
Geneva,Utah C11 ..... 7.05
Houston S5 ..... 7.15
Johnstown,Pa. B2 ..... 7.05
SparrowsPoint,Md. B2 ..... 7.05

PLATES, Wrought Iron
Economy,Pa. B14 ..... 14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 ..... 7.95
Ashland,Ky. A10 ..... 7.95
Bessemer,Ala. T2 ..... 7.95
Clairton,Pa. U5 ..... 7.95
Claymont,Del. P4 ..... 7.95
Cleveland J5, R2 ..... 7.95
Coatesville,Pa. L7 ..... 7.95
Conshohocken,Pa. A3 ..... 7.95
Economy,Pa. B14 ..... 7.95
Ecorse,Mich. G5 ..... 7.95
Fairfield,Ala. T2 ..... 7.95
Farrell,Pa. S3 ..... 7.95
Fontana,Calif.(30) K1 ..... 8.75
Gary,Ind. U5 ..... 7.95
Geneva,Utah C11 ..... 7.95
Houston S5 ..... 8.05
Ind.Harbor,Ind. I-2, Y1 ..... 7.95
Johnstown,Pa. B2 ..... 7.95
Munhall,Pa. U5 ..... 7.95
Pittsburgh J5 ..... 7.95
Seattle B3 ..... 8.85
Sharon,Pa. S3 ..... 7.95
S.Chicago,Ill. U5, W14 ..... 7.95
SparrowsPoint,Md. B2 ..... 7.95
Sterling,Ill. N15 ..... 7.625
Warren,O. R2 ..... 7.95
Youngstown U5, Y1 ..... 7.95

PLATES, Alloy
Aliquippa,Pa. J5 ..... 7.50
Claymont,Del. P4 ..... 7.50
Coatesville,Pa. L7 ..... 7.50
Economy,Pa. B14 ..... 7.50
Farrell,Pa. S3 ..... 7.50
Fontana,Calif. K1 ..... 8.30
Gary,Ind. U5 ..... 7.50
Houston S5 ..... 7.60
Ind.Harbor,Ind. Y1 ..... 7.50
Johnstown,Pa. B2 ..... 7.50
Lowellville,O. S3 ..... 7.50
Munhall,Pa. U5 ..... 7.50
Newport,Ky. A2 ..... 7.50
Pittsburgh J5 ..... 7.50
Seattle B3 ..... 8.40
Sharon,Pa. S3 ..... 7.50
S.Chicago,Ill. U5, W14 ..... 7.50
SparrowsPoint,Md. B2 ..... 7.50
Youngstown Y1 ..... 7.50

FLOOR PLATES
Cleveland J5 ..... 6.375
Conshohocken,Pa. A3 ..... 6.375
Harrisburg,Pa. P4 ..... 6.375
Ind.Harbor,Ind. I-2 ..... 6.375
Munhall,Pa. U5 ..... 6.375
Pittsburgh J5 ..... 6.375
S.Chicago,Ill. U5 ..... 6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ..... 5.55
Ashland l.c.l.(15) A10 ..... 6.05
Cleveland c.l. R2 ..... 6.05
Warren,O. R2 ..... 6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ..... 5.675
Aliquippa,Pa.(9) J5 ..... 5.675
Alton,Ill. L1 ..... 5.875
Atlanta(9) A11 ..... 5.875
Bessemer,Ala.(9) T2 ..... 5.675
Birmingham(9) C15 ..... 5.675
Buffalo(9) R2 ..... 5.675
Canton,O.(23) R2 ..... 6.15
Clairton,Pa.(9) U5 ..... 5.675
Cleveland(9) R2 ..... 5.675
Ecorse,Mich.(9) G5 ..... 5.675
Emeryville,Calif. J7 ..... 6.425
Fairfield,Ala.(9) T2 ..... 5.675
Fairless,Pa.(9) U5 ..... 5.825
Fontana,Calif.(9) K1 ..... 6.375
Gary,Ind.(9) U5 ..... 5.675
Houston(9) S5 ..... 5.925
Ind.Harbor(9) I-2, Y1 ..... 5.675
Johnstown,Pa.(9) B2 ..... 5.675
Joliet,Ill. P2 ..... 5.675
KansasCity,Mo.(9) S5 ..... 5.925
Lackawanna(9) B2 ..... 5.675
LosAngeles(9) B3 ..... 6.375
Massillon,O.(23) R2 ..... 6.15
Midland,Pa.(23) C18 ..... 6.025
Milton,Pa. M18 ..... 5.825
Minnequa,Colo. C10 ..... 6.125
Niles,Calif. P1 ..... 6.375
Owensboro,Ky.(9) G8 ..... 6.025
Pittsburg,Calif.(9) C11 ..... 6.375
Pittsburgh(9) J5 ..... 5.675
Portland,Oreg. O4 ..... 6.425
Riverdale,Ill.(9) A1 ..... 5.675
Seattle(9) A24,B3,N15 ..... 6.425
S.Ch'c'go(9)R2,U5,W14 ..... 5.675
S.Duquesne,Pa.(9) U5 ..... 5.675
S.SanFran.,Calif.(9)B3 ..... 6.425
Sterling,Ill.(1)(9) N15 ..... 5.675
Sterling,Ill.(9) N15 ..... 5.775
Struthers,O.(9) Y1 ..... 5.675
Tonawanda,N.Y. B12 ..... 5.675
Torrance,Calif.(9) C11 ..... 6.375
Warren,O. C17 ..... 6.025
Youngstown(9) R2,U5 ..... 5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ..... 6.725
Bethlehem,Pa. B2 ..... 6.725
Bridgeport,Conn. C32 ..... 6.80
Buffalo R2 ..... 6.725
Canton,O. R2, T7 ..... 6.725
Clairton,Pa. U5 ..... 6.725
Detroit S41 ..... 6.725
Economy,Pa. B14 ..... 6.725
Ecorse,Mich. G5 ..... 6.725
Farrell,Pa. S3 ..... 6.725
Fontana,Calif. K1 ..... 7.775
Gary,Ind. U5 ..... 6.725
Houston S5 ..... 6.975
Ind.Harbor,Ind. I-2, Y1 ..... 6.725
Johnstown,Pa. B2 ..... 6.725
KansasCity,Mo. S5 ..... 6.975
Lackawanna,N.Y. B2 ..... 6.725
LosAngeles B3 ..... 7.775
Lowellville,O. S3 ..... 6.725
Massillon,O. R2 ..... 6.725
Midland,Pa. C18 ..... 6.725
Owensboro,Ky. G8 ..... 6.725
Pittsburgh J5 ..... 6.725
Seattle(6) B3 ..... 7.825
Sharon,Pa. S3 ..... 6.725
S.Chicago R2, U5, W14 ..... 6.725
S.Duquesne,Pa. U5 ..... 6.725
Struthers,O. Y1 ..... 6.725
Warren,O. C17 ..... 6.725
Youngstown U5 ..... 6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ..... 8.30
Bessemer,Ala. T2 ..... 8.30
Bethlehem,Pa. B2 ..... 8.30
Clairton,Pa. U5 ..... 8.30
Cleveland R2 ..... 8.30
Ecorse,Mich. G5 ..... 8.30
Fairfield,Ala. T2 ..... 8.30
Fontana,Calif. K1 ..... 9.00
Gary,Ind. U5 ..... 8.30
Houston S5 ..... 8.55
Ind.Harbor,Ind. Y1 ..... 8.30
Johnstown,Pa. B2 ..... 8.30
KansasCity,Mo. S5 ..... 8.55
Lackawanna,N.Y. B2 ..... 8.30
LosAngeles B3 ..... 9.00
Pittsburgh J5 ..... 8.30
Seattle B3 ..... 9.05
S.Chicago,Ill. R2, W14 ..... 8.30
S.Duquesne,Pa. U5 ..... 8.30
S.SanFrancisco B3 ..... 9.05
Sterling,Ill. N15 ..... 7.925
Struthers,O. Y1 ..... 8.30
Youngstown U5 ..... 8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..... 5.825
Houston(9) S5 ..... 5.925
KansasCity,Mo.(9) S5 ..... 5.925
Lackawanna(9) B2 ..... 5.675
Sterling,Ill. N15 ..... 5.775
Sterling,Ill.(1) N15 ..... 5.675
Tonawanda,N.Y. B12 ..... 5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ..... 5.675
Atlanta A11 ..... 5.875
Joliet,Ill. P22 ..... 5.675
Minnequa,Colo. C10 ..... 6.125
Niles,Calif. P1 ..... 6.375
Pittsburgh J5 ..... 5.675
Portland,Oreg. O4 ..... 6.425
SanFrancisco S7 ..... 6.52
Seattle B3 ..... 6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 ..... 16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 7.05
KansasCity,Mo. S5 ..... 7.05
Pittsburgh J5 ..... 6.80
Youngstown U5 ..... 6.80

BARS, C.F. Leaded (including leaded extra) Carbon
LosAngeles P2, S30 ..... 11.75*
Alloy
Ambridge,Pa. W18 ..... 10.175
BeaverFall,Pa. M12 ..... 10.175
Camden,N.J. P13 ..... 10.35
Chicago W18 ..... 10.175
Elyria,O. W8 ..... 10.175
Monaca,Pa. S17 ..... 10.175
Newark,N.J. W18 ..... 10.35
SpringCity,Pa. K3 ..... 10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ..... 7.65
BeaverFalls,Pa. M12,R2 ..... 7.65
Birmingham C15 ..... 8.25
Buffalo B5 ..... 7.70
Camden,N.J. P13 ..... 8.10
Carnegie,Pa. C12 ..... 7.65
Chicago W18 ..... 7.65
Cleveland A7, C20 ..... 7.65
Detroit B5, P17 ..... 7.85
Detroit S41 ..... 7.65
Donora,Pa. A7 ..... 7.65
Elyria,O. W8 ..... 7.65
FranklinPark,Ill. N5 ..... 7.65
Gary,Ind. R2 ..... 7.65
GreenBay,Wis. F7 ..... 7.65
Hammond,Ind. J5, L2 ..... 7.65
Hartford,Conn. R2 ..... 8.15
Harvey,Ill. B5 ..... 7.65
LosAngeles(49) S30 ..... 9.10
LosAngeles(49) P2, R2 ..... 9.10
Mansfield,Mass. B5 ..... 8.20
Massillon,O. R2, R8 ..... 7.65
Midland,Pa. C18 ..... 7.65
Monaca, Pa. S17 ..... 7.65
Newark,N.J. W18 ..... 8.10
NewCastle,Pa.(17) B4 ..... 7.65
Pittsburgh J5 ..... 7.65
Plymouth,Mich. P5 ..... 7.90
Putnam,Conn. W18 ..... 8.20
Readville,Mass. C14 ..... 8.20
Seattle(49) S30 ..... 9.10
S.Chicago,Ill. W14 ..... 7.65
SpringCity,Pa. K3 ..... 8.10
Struthers,O. Y1 ..... 7.65
Warren,O. C17 ..... 7.65
Waukegan,Ill. A7 ..... 7.65
Willimantic,Conn. J5 ..... 8.15
Youngstown F3, Y1 ..... 7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19 ..... 6.55

BARS, Cold-Finished Alloy
Ambridge Pa. W18 ..... 9.025
BeaverFalls,Pa. M12,R2 ..... 9.025
Bethlehem,Pa. B2 ..... 9.025
Bridgeport,Conn. C32 ..... 9.175
Buffalo B5 ..... 9.025
Camden,N.J. P13 ..... 9.20
Canton,O. T7 ..... 9.025
Carnegie,Pa. C12 ..... 9.025
Chicago W18 ..... 9.025
Cleveland A7, C20 ..... 9.025
Detroit B5, P17 ..... 9.225
Detroit S41 ..... 9.025
Donora,Pa. A7 ..... 9.025
Elyria,O. W8 ..... 9.025
FranklinPark,Ill. N5 ..... 9.025
Gary,Ind. R2 ..... 9.025
GreenBay,Wis. F7 ..... 9.025
Hammond,Ind. J5, L2 ..... 9.025
Hartford,Conn. R2 ..... 9.325
Harvey,Ill. R5 ..... 9.025
Lackawanna,N.Y. B3 ..... 9.025
LosAngelesP2, S30 ..... 11.00
Mansfield,Mass. B5 ..... 9.325
Massillon,O. R2, R8 ..... 9.025
Midland,Pa. C18 ..... 9.025
Monaca,Pa. S17 ..... 9.025
Newark,N.J. W18 ..... 9.20
Plymouth,Mich. P5 ..... 9.225
S.Chicago,Ill. W14 ..... 9.025
SpringCity,Pa. K3 ..... 9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 .....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 ....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35

SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.)L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 .5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ...5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ....7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.06
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.06

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleve.and J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ....6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill. G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 ....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ....6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 .....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ...6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ...5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ...6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ...5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2,Y1 7.575
Lackawanna,N.Y. B2..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 .....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ..7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind.Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)*	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7 T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (1¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	..	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ...8.25
Monessen,Pa. P7, P16..8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 .....8.00
Rankin,Pa. A7 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 .....13.40
KansasCity,Mo. U3 ....12.90
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ...13.50
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16...9.75
NewHaven,Conn. A7 ...10.05
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Millbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass. A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ...16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 .....13.75
Portsmouth,O. P12 .....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ....13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	173
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	212
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190‡
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196‡
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196‡
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198‡
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala. R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65‡
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75‡
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190‡
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190‡
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality (6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325‡
Atlanta(48) A11	9.00	9.75*
Bartonville(48)K4	9.85	19.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675‡
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625‡
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35‡
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775‡
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. ‡10c. Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85
⅞ in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1¼ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:

Packaged	+ 5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packaged	+29

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1⅝	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2½	12	49.24	57.72	43.70
2¾	12	54.23	63.57	48.13
3	12	58.73	68.83	52.13
3¼	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....(16)	6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 3 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1¼		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 12.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	#71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	36.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	56.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides 20%
Copper*	36.35	43.40

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.845
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y., R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max).	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	8.66	10.06	....	8.28	8.55	11.70	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.88	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.80
Indianapolis	9.01	10.64	10.59	....	11.18	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	8.95	11.20	11.45	61.27	10.65	9.00	14.20	17.35	9.90	8.40	11.15
Memphis, Tenn.	8.98	10.05	....	....	10.64	8.82	12.74	....	9.01	8.66	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	8.92	10.55	10.50	....	10.90	8.90	11.00	16.30	9.26	8.76	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.35	9.60	10.66	52.71	10.35	8.75	11.95	16.38	8.95	8.70	9.95
Pittsburgh	8.57	9.88	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	9.45	11.30	12.35	....	11.45	9.45	16.65	17.80	10.05	9.60	11.75
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅜ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ⅛ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	23.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.75-20.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-58%, Indian, 85-90¢, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charlestown, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.80
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted.)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. truckiots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe, ton, del. east of Mississippi.	36.75,
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	*37.50*
Bronze powder, 90/10	*56.10*
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	*58.70*
Solder	*7.50**
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	*24.20*
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Everett, Mass., ovens: New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.25 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	*$5.62*	....	*$5.52*	*$5.37*	*$5.72*
Bar Size Angles	*5.75*	....	*5.65*	*5.50*	*5.85*
Structural Angles	*5.05*	....	*5.55*	*5.40*	*5.75*
I-Beams	*5.65*	....	*5.55*	*5.40*	*5.75*
Channels	*5.65*	....	*5.55*	*5.40*	*5.75*
Plates (basic bessemer)	5.70	....	5.60	5.45	5.80
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	*25.20*	....	*24.40*	*24.40*	*25.20*
Barbed Wire (†)	*6.50*	....	*6.40*	*6.25*	*6.60*
Merchant Bars	*5.75*	....	*5.65*	*5.50*	*5.85*
Hot-Rolled Bands	5.85	....	5.75	5.60	5.90
Wire Rods, Thomas Commercial No. 5	*5.80*	....	*5.75*	*5.75*	*6.00*
Wire Rods, O.H., No. 5	*6.00*	....	*5.95*	*5.95*	*6.25*
Bright Common Wire Nails (§)	6.85	....	6.75	6.60	6.95

*Book closed for 1960-61 shipping season. †Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

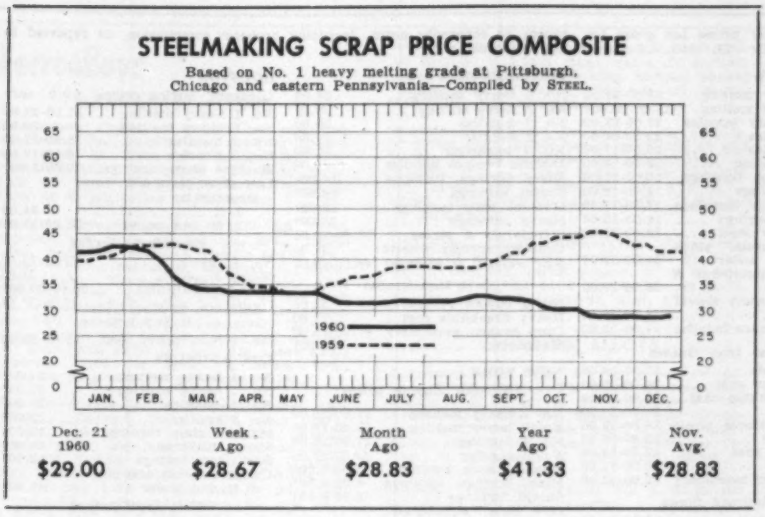
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per net ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00



Modest Buying Lifts Scrap Index

STEEL's composite on No. 1 heavy melting grade rises 33 cents to $29 as brokers seek to cover commitments before an expected January rise in steelmaking generates market strength

Scrap Prices, Page 92

• **Chicago** — Small purchases of steelmaking scrap have pushed prices up $1 a ton on a number of leading grades. Contributing to the stronger market, the first advance since July, is a flurry of activity by brokers to complete outstanding orders while the market is at bottom and before an anticipated upturn in the steelmaking rate next year can increase demand for scrap and stimulate prices. No. 1 industrial heavy melting sold last week at $28, but an important area mill adheres to $27 for return scrap from selected customers. The foundry grades are quoted $1 higher.

• **Philadelphia** — Domestic prices on No. 2 heavy melting steel and No. 2 bundles have advanced $1. No. 2 heavy melting now being quoted $30, and No. 2 bundles $21, delivered. Orders for both grades are small, but scarcity resulting from export buying has stiffened the market. Rail crops are off $1 to $46-$48, delivered.

• **New York**—Except for a $1 increase on No. 2 bundles to $14-$15, brokers' buying prices are unchanged. Buying for domestic account remains dull, with export demand the major sustaining factor. Prices on several items are purely nominal due to lack of trading—including borings and turnings and most grades of stainless steel specialties.

• **Cleveland**—Scrapmen are anticipating a pickup in buying after the holidays, but tonnage movement from dealers' yards will be limited the rest of this year. Some dealers think January buying will be stimulated by reduced hot metal output, making steelmakers more dependent on scrap to support open hearth operations.

• **Pittsburgh** — With steelmakers and foundries cutting their production sharply for the holidays, there's little activity in scrap. Prices are unchanged, but sellers are becoming increasingly optimistic about prospects for a stronger market after the first of the year. If local consumers decide that they need some of the scrap that's being drawn out of the hinterlands for export, prices may advance.

• **Detroit**—Small speculative buying indicates the local market is firming up slightly, but dealers and brokers expect no significant changes on monthend auto lists since the steel mills show no intentions of buying in quantity. List prices are expected to hold, though some observers think they may go up $1.

• **Buffalo**—There's a little better feeling in the local scrap trade, though demand continues slow. With the steel mills reporting a slight pickup in orders for January shipment, scrapmen anticipate improved steelmaking operations and resulting heavier scrap requirements. Virtually no trading is being done, but prices are nominally unchanged.

• **Cincinnati**—Prices may be headed for an upturn. Brokers are reported paying full mill prices to fill their outstanding commitments.

• **Birmingham**—Prices are holding steady despite continued sluggish demand. Dealers do not anticipate any pickup in demand until after the turn of the year.

• **Houston**—The price of cast iron grades dropped $1 a ton last week on slow domestic demand. Fairly brisk export trade is reported.

• **San Francisco**—The Japanese are reported paying $4 to $5 a ton above the domestic price level for top grade steel scrap. Local mills are paying $32 for No. 1 heavy melting, but they are taking little tonnage.

• **Los Angeles**—Dealers think export demand will remain strong the next two to three months. Collections are slow, reflecting the general sluggishness in business. A pickup in the flow of material to yards is expected after the turn of the year.

• **Seattle** — Consumers are well stocked, and there is little activity in the market. Low consumer inventories, in part, are sought by buyers because of yearend tax liability. No price revisions are thought likely until next month when a more active demand is anticipated.

Exporters are preparing for a busy first quarter. Commercial Terminals Inc., this city, has resumed operations following settlement of a labor dispute over crane operation. The firm purchased five Liberty

(*Please turn to Page* 96)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Dec. 21, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 21	$29.00
Dec. 14	28.67
Nov. Avg.	28.83
Dec. 1959	41.71
Dec. 1955	50.37

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 dealer bundles	27.00-28.00
No. 2 bundles	20.00-21.00
No. 1 busheling	26.00-27.00
No. 1 factory bundles	31.00-32.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	11.00-12.00
Short turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut structurals:	
2 ft and under	31.00-32.00
3 ft and under	30.00-31.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	34.00-35.00
Electric furnace bundles	32.00-33.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	31.00-32.00
Stove plate	27.00-28.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	31.00-32.00
Drop broken machinery	44.00-45.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	29.00-30.00
Rails, 2 ft and under	48.00-49.00
Rails, 18 in. and under	49.00-50.00
Random rails	41.00-42.00
Angles, splice bars	37.00-38.00
Railroad specialties	39.00-40.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*27.00-28.00*
No. 1 hvy melt., dealer	*25.00-26.00*
No. 2 heavy melting	*23.00-24.00*
No. 1 factory bundles	*30.00-31.06*
No. 1 dealer bundles	*26.00-27.00*
No. 2 bundles	16.00-17.00
No. 1 busheling, indus.	*27.00-28.00*
No. 1 busheling, dealer	*25.00-26.00*
Machine shop turnings	11.00-12.00
Mixed borings, turnings	13.00-14.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Cut structurals, 3 ft	*31.00-32.00*
Punchings & plate scrap	*33.00-34.00*

Cast Iron Grades

No. 1 cupola	*37.00-38.00*
Stove plate	*31.00-32.00*
Unstripped motor blocks	*29.00-30.00*
Clean auto cast	*42.00-43.00*
Drop broken machinery	*42.00-43.00*

Railroad Scrap

No. 1 R. R. heavy melt	*29.00-30.00*
R.R. malleable	*41.00-42.00*
Rails, 2 ft and under	*43.00-44.00*
Rails, 18 in. and under	*44.00-45.00*
Angles, splice bars	*38.00-39.00*
Axles	*49.00-50.00*
Rails, rerolling	*48.00-49.00*

Stainless Steel Scrap

18-8 bundles, solids	160.00-165.00
18-8 turnings	90.00-95.00
430 bundles & solids	75.00-80.00
430 turnings	40.00-45.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	17.00-18.00
No. 2 heavy melting	13.00-14.00
No. 1 bundles	19.00-20.00
No. 2 bundles	10.00-11.00
No. 1 busheling	16.00-17.00
Machine shop turnings	5.00-6.00
Mixed borings, turnings	5.00-6.00
Shovel turnings	6.00-7.00

Cast Iron Grades

No. 1 cupola	28.00-29.00
Stove plate	22.00-23.00
Heavy breakable	21.00-22.00
Unstripped motor blocks	17.00-18.00
Charging box cast	23.00-24.00
Clean auto cast	34.00-35.00

CLEVELAND

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00†
No. 1 factory bundles	27.00-28.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Machine shop turnings	10.00-11.00
Shovel turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Cast iron borings	14.00-15.00
Cut foundry steel	28.00-29.00
Cut structurals, plate 2 ft and under	31.00-32.00
Low phos. punchings & plate	26.00-27.00
Alloy free, short shovel turnings	14.00-15.00
Electric furnace bundles	24.00-25.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	24.00-25.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	28.00-29.00
Brake shoes	35.00-36.00
Clean auto cast	42.00-43.00
Burnt cast	30.00-31.00
Drop broken machinery	42.00-43.00

Railroad Scrap

R.R. malleable	42.00-43.00
Rails, 2 ft and under	45.00-46.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	38.00-39.00
Cast steel	32.00-33.00
No. 1 railroad cast	42.00-43.00
Railroad specialties	37.00-38.00
Angles, splice bars	36.00-37.00
Rails, rerolling	51.00-52.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	150.00-155.00
18-8 turnings	65.00-70.00
430 clips, bundles, solids	65.00-70.00
430 turnings	10.00-20.00

YOUNGSTOWN

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 busheling	26.00-27.00
No. 1 bundles	26.00-27.00
No. 2 bundles	20.00-21.00
Machine shop turnings	12.00-13.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	27.00-28.00
Electric furnace bundles	27.00-28.00

Railroad Scrap

No. 1 R.R. heavy melt.	29.50-30.50

BUFFALO

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Shovel turnings	13.00-14.00
Machine shop turnings	9.00-10.00
Cast iron borings	11.00-12.00
Low phos. structurals and plates, 2 ft and under	33.00-34.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	36.00-37.00
No. 1 machinery	43.00-44.00

Railroad Scrap

Rails, random lengths	36.00-37.00
Rails, 3 ft and under	42.00-43.00
Railroad specialties	35.00-36.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	22.50-23.50
No. 2 heavy melting	19.50-20.50
No. 1 bundles	23.50-24.50
No. 2 bundles	15.00-16.00
No. 1 busheling	22.50-23.50
Machine shop turnings	8.00-9.00
Mixed borings, turnings	8.00-9.00
Shovel turnings	10.00-11.00
Cast iron borings	10.00-11.00
Low phos. 18 in.	31.00-32.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	36.00-37.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	*30.00*
No. 1 bundles	35.00
No. 2 bundles	*21.00*
No. 1 busheling	35.00
Electric furnace bundles	36.00
Mixed borings, turnings	14.00†
Shovel turnings	18.00†
Machine shop turnings	13.00†
Heavy turnings	25.00†
Structurals & plates	37.00-39.00
Couplers, springs, wheels	37.00
Rail crops, 2 ft & under	*46.00-48.00*

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	37.00
Drop broken machinery	47.00-48.00
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	18.00-19.00
No. 1 bundles	27.00-28.00
No. 2 bundles	*14.00-15.00*
Machine shop turnings	3.50-4.00†
Mixed borings, turnings	4.00-4.50†
Shovel turnings	5.00-6.00†
Low phos. structurals & plates	31.00-32.00†

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	28.00-29.00

Stainless Steel

18-8 sheets, clips, solids	140.00-145.00†
18-8 borings, turnings	70.00-75.00†
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	50.00-55.00†

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 1 busheling	23.00-24.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	28.00-29.00
No. 2 bundles	20.00-21.00
No. 1 busheling	29.00-30.00
Cast iron borings	10.00-11.00
Machine shop turnings	15.00-16.00
Shovel turnings	18.00-19.00
Bar crops and plate	35.00-36.00†
Structurals & plate	35.00-36.00†
Electric furnace bundles	30.00-31.00†
Electric furnace:	
3 ft and under	31.00-32.00
2 ft and under	33.00-34.00

Cast Iron Grades

No. 1 cupola	41.00-42.00†
Stove plate	41.00-42.00†
Unstripped motor blocks	30.00-31.00†
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	38.00-39.00
Angles, splice bars	37.00-38.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	27.00
No. 2 heavy melting	25.00
No. 1 bundles	28.00
No. 2 bundles	18.00
No. 1 busheling	28.00
Machine shop turnings	7.00
Shovel turnings	9.00

Cast Iron Grades

No. 1 cupola	36.00
Charging box cast	33.00
Heavy breakable cast	31.00
Unstripped motor blocks	33.00
Clean auto cast	39.00
Stove plate	34.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00
Rails, random lengths	35.00
Rails, rerolling	44.00
Rails, 18 in. and under	38.00
Angles, splice bars	32.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	29.00
No. 1 bundles	31.00-32.00
No. 2 bundles	18.00-19.00
Machine shop turnings	7.00-8.00†
Low phos. plate & structurals:	
3 ft	34.00
2 ft and under	36.00-37.00

Cast Iron Grades

No. 1 cupola	*33.00-33.50*
Heavy breakable	*24.00*
Foundry malleable	29.00-30.00†
Unstripped motor blocks	*27.00-27.50*

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00

LOS ANGELES

No. 1 heavy melting	34.00*
No. 2 heavy melting	30.00*
No. 1 bundles	28.00†
No. 2 bundles	*22.00**
Machine shop turnings	12.00†
Shovel turnings	14.00†
Cast iron borings	12.00†
Cut structurals and plate 1 ft and under	41.00†

Cast Iron Grades

No. 1 cupola	35.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00†

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00
No. 2 heavy melting	34.00
No. 2 bundles	19.00
Shovel turnings	13.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	31.50
Heavy breakable	31.00
Unstripped motor blocks	31.00
Stove plate (f.o.b. plant)	18.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00
No. 1 (prepared for shears)	33.00
No. 1 hvy (unprepared)	33.00
No. 2 heavy melting	34.00
No. 2 hvy (unprepared)	30.00
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	31.50
Heavy breakable cast	33.00
Unstripped motor blocks	30.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	29.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	24.00
No. 2 hvy melt, 2 ft & under	22.50
No. 1 bundles	24.00
No. 2 bundles	17.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	23.00
Unprepared	18.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	30.00

*For export add $4 dock charges.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton. Palmerton, Pa. 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. Ti 38-43%, Al 5% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5.8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 63-68%, C 3-5%, Si 2.5% max, 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 33.50c per lb contained Cr; 0.010% max, 34.50c. Delivered.

Cr, 65-71%, carload, lump, bulk, 0.025% max, 35.00c; 0.05% max, 34.00c; 0.10% max, 33.75c; 0.20% max, 33.50c; 0.50% max, 33.25c; 1.0% max, 33.00c; 1.5% max, 32.75c; 2.0% max, 32.50c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). SM x D, carload, bulk, 20.0c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 24.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.06% max, 24.50c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down, 26.25c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb, (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ⅛ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-S Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

Nonferrous Outlook Is Hazy

Nonferrous Metal Prices, Pages 95 & 96

SELDOM has the nonferrous industry been so disinclined to make forecasts for a coming year.

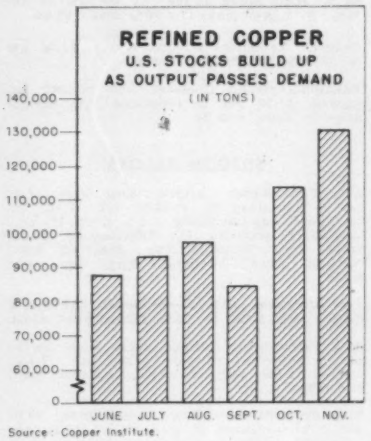
No one knows if the economy will continue to move sideways, or if the soaring sixties will gain some momentum next year. Defense demand, of prime importance to many metals, is cloudy. User inventory plans are a mystery. How many autos is Detroit going to produce? Will John Q. Public loosen the hold on his pocketbook to buy TVs, boats, and baby buggies, or will he bank his extra cash?

Here's how the 1961 market seems to shape up:

● **Titanium**—The outlook is hazy but titanium men think 1961 should wind up about on a par with this year. That means prospects are good. Titanium mill product shipments will hit about 10 million lb in 1960, a whopping 56 per cent increase over the 1959 pace. As T. W. Lippert, director of marketing for Titanium Metals Corp. of America, puts it: "This performance almost ties the 1956 capacity production of 10.1 million lb and is exceeded basically only by 1957's shipments of 11.3 million lb—a rate achieved before cutbacks in defense spending set titanium production sliding to about 4 per cent of capacity by yearend."

Titanium's showing in 1961 will depend primarily on defense business (about 85 per cent of shipments go to the military). The missile business is picking up (it now accounts for about 17 per cent of the market). Such civilian markets as commercial aircraft and chemical industry apparatus are growing. One large unknown: '61 procurement of metal for the B-70 program.

● **Nickel**—Free World consumption of nickel this year will soar to a new high of 500 million lb for a 15 per cent increase over the 1959 mark, forecasts Henry S. Wingate, chairman, International Nickel Co. of Canada Ltd. Heavy demand from Europe is the primary reason. North American consumption is about the same as last year's. Geographically, consumption breaks down like this: Europe 43.5 per cent; U. S. 43 per cent; Canada 2.5 per cent; others 11 per cent.



Source: Copper Institute

Growth in nickel bearing stainless steels marked the sharpest increase for the metal during the year. The electroplating market also gained. By use, Free World 1960 consumption breaks down: Stainless steels 32 per cent; electroplating 16 per cent; high nickel alloys 15 per cent; nickel alloy steels 13 per cent; iron and steel castings 12 per cent; copper and brass products 4 per cent; all others 8 per cent.

It's too early to tell if '61 will be another record breaker, but forecasts indicate a high level of consumption. Supply is adequate: Free World capacity will rise to about 600 million lb. The price should be stable throughout the year.

● **Bismuth** — U. S. consumption should rise modestly in 1961 over the estimated 1.5 million lb figure set this year. Prices look stable.

Industrial uses rose in 1960, and the trend should continue. Metal usage in fusible alloys and as an alloying material in aluminum and malleable iron accounted for about 50 per cent of domestic demand; pharmaceuticals, experimental uses, and miscellaneous applications the other 50 per cent.

Under the pressure of increased consumption, producers' stocks were halved during the year, despite a doubling of imports. But no supply shortage is foreseen.

● **Tellurium**—The outlook is still extremely good, mainly because of the metal's high potential in thermoelectric applications. The initial wave of scare buying that marked part of 1960 has eased off and demand now is largely for consumption.

About two to three times as much tellurium should go into thermoelectric applications in 1961. Total U. S. demand will be up from the 330,000 lb shipped in 1960, but by how much is anyone's guess.

Prices Look Fairly Stable

● **Cadmium** — A record breaking year for the metal was predicted by STEEL on Sept. 12 (page 196). But it looks like shipments will do even better and hit around 13.6 million lb.

Shipments in '61 won't be as good because there just isn't enough metal to satisfy such demand. For example, over the first nine months of the year North American producers turned out 9.2 million lb of metal, but they shipped 10.6 million lb. Producers' stocks tumbled from 3,066,000 lb on Jan. 1 to 1,799,000 lb on Oct. 1.

Cadmium production is tied to zinc, so supplies will be dictated by the amount of zinc recovered. The pinch will be alleviated to some extent by the strike settlement at New Jersey Zinc Co. and the pending settlement at the Bunker Hill Co. Imports will also help, but with the strong demand in Europe, they may not be too plentiful.

The cadmium price went up twice

(*Please turn to Page* 96)

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 26.25-26.75, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment data, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.
Copper: Electrolytic, 30.00 deld.; custom smelters, 30.00; lake, 30.00 deld.; fire refined, 29.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 1950; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 101.375; prompt, 101.875.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 12.00; brass special, 12.25; intermediate, 12.00, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 13.35; special high grade, 13.50 deld. Die casting alloy ingot No. 3, 15.00; No. 2, 15.50; No. 5, 15.25 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb, 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.00.

Brass Ingot: Red brass, No. 115, 28.25; tin bronze, No. 225, 38.00; No. 245, 32.50; high-leaded tin bronze, No. 305, 32.75; No. 1 yellow, No. 405, 23.50; manganese bronze, No. 421, 27.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.945, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.945, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 35.35; l.c.l., 35.98. Weatherproof, 20,000-lb lots, 36.30; l.c.l., 37.05.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-36	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.90
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.40-67.40
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.40
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .062 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.50; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.75-24.25; No. 2 heavy copper and wire, 22.00-22.50; light copper, 19.00-19.50; No. 1 composition red brass, 19.75-20.25; No. 1 com-

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	55.13b	52.36c	....	56.32
Yellow Brass	49.27	34.88d	49.56	53.43
Low Brass, 80%	51.75	51.69	52.04	55.81
Red Brass, 85%	52.62	52.56	52.91	56.68
Com. Bronze, 90%	54.03	53.97	54.32	57.84
Manganese Bronze	57.77-57.82	51.42-51.46	61.69	....
Muntz Metal	52.14	47.45	....	....
Naval Brass	54.08	47.89	60.39	58.24
Silicon Bronze	60.45-60.48	59.64-59.67	59.74-59.77	78.89
Nickel Silver, 10%	64.68	67.01	66.76	....
Phos. Bronze, A-5%	75.70	76.20	75.45	77.63

SCRAP ALLOWANCES e (Based on copper at 30.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper	26.000	26.000	25.250
Yellow Brass	20.375	19.625	18.625
Low Brass, 80%	22.500	22.250	21.750
Red Brass, 85%	23.250	23.000	22.500
Com. Bronze, 90%	24.000	23.750	23.250
Manganese Bronze	19.250	19.000	18.375
Muntz Metal	19.475	19.125	18.625
Naval Brass	19.125	18.875	18.375
Silicon Bronze	25.500	25.250	24.500
Nickel Silver, 10%	25.125	24.875	12.562
Phos. Bronze, A-5%	27.125	26.875	25.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

(*Concluded from Page* 94)

in 1960 and now stands at $1.60 a pound. (Large orders are priced at various discounts.) It could rise in '61, but probably not by much.

Zinc Price Falls Again

For the second time in less than a week, the price of zinc has been lowered 0.5 cent a pound. The latest change came last Monday (Dec. 19) and puts the price of prime Western zinc at 12 cents a pound (East St. Louis, Ill., basis), the lowest it has been since October, 1959. Other zinc grades and the diecasting alloys are also down 0.5 cent.

Behind the move are the same pressures that triggered the first drop: Poor sales, weak prices overseas, rising stocks, some price discounting, and the ending of strikes at some U. S. facilities.

Scrap . . .

(*Concluded from Page* 91)

ships for scrapping at Seattle and Bellingham shipyards; the scrap will be shipped to Japan.

Scrap Use Tops Pig Iron For Third Straight Month

Domestic consumption of ferrous scrap in October increased 5 per cent over that in September because of a longer month and a 2 per cent increase in daily use, reports the U. S. Bureau of Mines. The total metallic charge (8,392,000 gross tons) consisted of 52 per cent scrap (4,373,000 tons) and 48 per cent pig iron (4,019,000 tons). October was the third straight month in which use of scrap in the metallic charge was greater than that of pig iron.

Stocks of scrap held by consumers on Oct. 31 totaled 8,493,000 tons, virtually unchanged from the end of September. Pig iron stocks were 3,264,000 tons, slightly higher than at the end of the preceding month.

Home scrap produced in October accounted for 2,522,000 tons, 3 per cent greater than during September. Purchased scrap received by consumers totaled 1,843,000 tons in the month, 15 per cent more than during September.

1960 Season Shipments of Lake Ore Show Good Gain

No shipments of iron ore down the Great Lakes route were made during December. Last year, 3,175,949 gross tons (3,125,695 from U. S. ports and 50,254 from Canadian) were moved in December.

The American Iron Ore Association reports lake ore shipments in the 1960 season totaled 69,631,789 tons, up sharply (22,750,339 tons) from the 46,881,450 tons moved in the 1959 shipping season. In only two other years of the last decade have shipments been smaller.

Year	Gross tons
1958	52,868,028
1957	84,615,871
1956	77,633,027
1955	87,459,853
1954	60,793,697
1953	95,844,449
1952	74,910,798
1951	89,092,012

A significant point in the American Iron Ore Association's report: Shipments from the two ports handling taconite pellets were up sharply. Taconite Harbor's total was 5,574,081 tons vs. 3,561,376 in 1959; Silver Bay's total was 4,941,322 tons vs. 3,640,008 in 1959.

Pig Iron . . .

Pig Iron Prices, Page 89

The merchant pig iron market is slow. Foundries will do little buying until the new year, getting along on minimum inventories. Many will close down for the entire Christmas week.

Once there is a rebound in foundry operations, some gain in pig iron shipments appears certain. It is believed that January as a whole will prove definitely better than December. A mild improvement is expected to develop throughout the first quarter, and a further gain is anticipated in the second quarter.

Wire . . .

Wire Prices, Pages 86 & 87

Merchant wire is available for spot delivery, while manufacturers' wire can be had for shipment within two to three weeks on most items. Domestic producers are still encountering stiff competition from foreign mills on the merchant

position turnings, 18.75-19.25; new brass clippings, 16.50-17.00; light brass, 13.50-14.00; heavy yellow brass, 14.50-15.00; new brass rod ends, 15.50-16.00; auto radiators, unsweated, 15.25-15.75; cocks and faucets, 16.25-16.75; brass pipe, 17.00-17.50.

Lead: Soft scrap lead, 7.25-7.75; battery plates, 2.25; linotype and stereotype, 8.00-8.50; electrotype, 7.00-7.25; mixed babbitt, 9.00-9.50.

Monel: Clippings, 23.00-24.00; old sheets 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 2.50-3.00; new diecast scrap, 3.75-4.00; old diecast scrap, 2.25-2.75.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 6.00-6.50; segregated low copper clips, 13.00-13.50; segregated high copper clips, 12.00-12.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.00; clean borings and turnings, 8.50; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.
Copper and Brass: No. 1 heavy copper and wire, 24.00; No. 2 heavy copper and wire, 23.00; light copper, 21.00; refinery brass (60% copper) dry copper content, 22.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.00; No. 2 heavy copper and wire, 23.00; light copper, 21.00; No. 1 composition borings, 19.50-21.25; No. 1 composition solids, 20.00-21.75; heavy yellow brass solids, 15.50-16.25; yellow brass turnings, 14.50-15.25; radiators, 16.00-16.75.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.04; oval, 43.50, 5000-10,000 lb; electrodeposited, 39.00, 2000-5000 lb lots; cast, 41.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 120.50; 200-499 lb, 119.00; 500-999 lb, 118.50; 1000 lb or more, 118.00.

Zinc: Balls, 19.25; flat tops, 19.25; flats, 22.00; ovals, 21.25, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.25; 2000-5900 lb, 13.25; 6000-11,900 lb, 13.00; 12,000-22,900 lb, 12.75; 23,000 lb or more, 12.25.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 79.50; 100-600 lb, 70.20; 700-1900 lb, 67.40; 2000-9900 lb, 65.60; 10,000 lb or more, 64.20.

Stannous Chloride (Anhydrous): 25 lb, 155.00; 100 lb, 150.10; 400 lb, 147.70; 800-19,900 lb, 106.80; 20,000 lb or more, 100.70.

Stannous Sulphate: Less than 50 lb, 140.20; 50 lb, 110.20; 100-1900 lb, 108.20; 2000 lb or more, 106.20.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

products, particularly nails and barbed wire.

Tubular Goods . . .

Tubular Goods Prices, Page 88

December may turn out to be the best month since March for oil country goods. Volume has been climbing slowly but steadily since August, and with two-thirds of December behind them, tubemakers are reasonably confident they will close the year on a strong note.

At best, December bookings will be no more than 5 per cent larger than November's. The upswing is largely indicative of inventory depletion by consumers. The major oil companies are nearly out of stock on some of the more popular sizes of tubing and casing. Some tubemakers estimate that half of their distributors have cut inventories of the bread-and-butter items as far as they can. They have large tonnages of heavy walled tubing—for which there's little demand at present.

The uptrend in oil country goods is expected to continue through the first quarter. The top may be reached in April or May, at a point that will support production at 60 to 65 per cent of capacity. Even if there are fewer well completions next year than in 1960—say 43,000 instead of 45,000—pipe shipments may increase. Reason: Users won't have inventories to lean upon.

The latest weekly survey by the Hughes Tool Co. shows the number of rotary rigs in operation in the U. S. and Canada is 2026, a high for the second half. The year's high was 2077 last January. The U. S. at latest count had 1863 rigs operating, up 28 from the preceding week; Canada had 163, up 10.

Rails, Cars . . .

Track Material Prices, Page 87

Tennessee Coal & Iron Div., U. S. Steel Corp., plans installation of new facilities for the production of axles at its Fairfield (Ala.) Steelworks. The new equipment will replace facilities that have been in service many years. The facility will include heat treating furnaces, additional cooling capacity, lathes, and other machine tools.

A. V. Wiebel, president of the division, said the aim of the program is to keep up with advances in railroad car design. He pointed out that many Southern railroads are replacing old rolling stock with cars of greater capacity, and they are being equipped with roller bearings instead of friction type bearings.

Tasmanian Ore Deposit May Contain 45% Iron

Two years of continuous drilling will be required to prove out the Savage River iron ore deposits in northwestern Tasmania. Drilling will establish the extent of the deposits—estimates range up to 200 million tons of ore averaging 45 per cent iron. Some Australian ores contain 65 per cent iron.

Structural Shapes . . .

Structural Shape Prices, Page 84

Structural steel market activity is hampered by weather conditions

Steel Product Shipments—October, 1960

(Net tons)

(All grades; Carbon, Alloy, Stainless)

Products	Carbon	Alloy	Stainless	Total	First 10 Months
Ingots	14,517	8,433	1,436	24,386	303,970
Blooms, etc.	48,104	25,698	1,386	75,188	1,239,575
Tube rounds	852	363	.....	1,215	15,187
Skelp	4,978	.....	.....	4,978	98,506
Wire rods	67,760	1,771	617	70,148	807,638
Structurals	355,901	5,657	22	361,580	4,205,436
Steel piling	35,834	.....	.....	35,834	366,106
Plates	363,843	37,881	2,959	404,683	5,368,582
Rails—standard	17,013	.....	.....	17,013	621,507
Rails—all other	2,664	.....	.....	2,664	40,582
Joint bars	817	.....	.....	817	24,605
Tie plates	3,398	.....	.....	3,398	117,854
Track spikes	1,644	.....	.....	1,644	41,259
Wheels	16,558	17	.....	16,575	216,841
Axles	8,012	.....	.....	8,012	99,580
Bars—hot rolled	380,360	103,432	3,403	487,195	6,061,403
Bars—reinforcing	228,681	.....	.....	228,681	1,890,075
Bars—cold finished	65,189	15,529	3,701	84,419	1,225,989
Tool steel	533	5,457	.....	5,990	75,382
Standard pipe	166,834	99	.....	166,933	1,860,766
Oil country goods	64,392	14,943	.....	79,335	1,022,635
Line pipe	162,441	1	.....	162,442	2,424,054
Mechanical tubing	35,503	17,086	421	53,010	671,952
Pressure tubing	15,585	4,336	1,312	21,233	234,150
Wire—drawn	183,632	3,095	1,539	188,266	2,108,789
Nails & staples	25,174	.....	1	25,175	284,799
Barbed wire	3,921	.....	.....	3,921	42,062
Woven fence	5,544	.....	.....	5,544	94,317
Bale ties, etc.	1,505	.....	.....	1,505	59,442
Black plate	38,916	.....	.....	38,916	509,840
Tin plate—HD	22,971	.....	.....	22,971	388,378
Tin plate—electro	300,944	.....	.....	300,944	4,579,097
Sheets—hot rolled	564,441	14,995	1,305	580,741	7,048,706
Sheets—cold rolled	991,893	3,127	8,957	1,003,977	12,697,010
Sheets—galvanized	210,162	.....	.....	210,162	2,693,495
Sheets—coated	20,968	.....	.....	20,968	229,054
Elec. sheets—strip	2,357	33,878	.....	36,235	491,509
Strip—hot rolled	95,503	1,201	151	96,855	1,153,601
Strip—cold rolled	74,935	1,086	14,049	90,070	1,160,047
Totals (1960)	4,604,279	298,085	41,259	4,943,623	62,543,780
Totals (1959)	1,268,786	127,466	23,045	1,419,297	56,376,387

Data from American Iron & Steel Institute.

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and yearend influences. Heavy snows and cold have temporarily halted work on many projects. But substantial new work is being figured, and most fabricators have enough work on hand to keep their shops busy over the next two or three months.

Orders for January are reported picking up a little, and some shapemakers predict next month's shipments will be 5 per cent above December's. But even if January brings modest improvement, the first quarter probably won't be any better than the fourth quarter. Actually, sellers anticipate little change in market conditions until March or April when construction and roadbuilding requirements will pick up seasonally.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

9000 tons, section, Gowanus Parkway, Brooklyn, N. Y., through Horn Construction Co., Long Island City, N. Y., to American Bridge Div., U. S. Steel Corp., Pittsburgh.

630 tons, Port of Kalama, Wash., grain elevator to Isaacson Iron Works, Seattle; Max J. Kuney Co., Portland, Oreg., general contractor.

545 tons, manufacturing building, Sylvania Electric Products Inc., Brookville, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

503 tons, state bridgework, Berks County, Pennsylvania, through Latrobe Road Construction Co., Latrobe, Pa., to the Cumberland Bridge Co.; 226 tons of reinforcing bars to Taylor-Davis Inc., Philadelphia.

435 tons, plant, American Can Co., Chambersburg, Pa., to High Welding Co., Lancaster, Pa.

320 tons, Oregon State overpass, Baker County; Gate City Steel Co. Inc., Boise, Idaho, reported low on subcontract; Morrison, Knudsen Co., Boise, general contractor at $443,856.

300 tons, Textron plant, Beaverton, Oreg., reported to Poole, McGonigle & Dick, Portland, Oreg.; Ross B. Hammond Co., Portland, general contractor.

250 tons, building, Weis Markets Inc., Sunbury, Pa., to M. L. Claster, a nearby fabricator.

228 tons, junior-senior high school, Medway, Mass., including 137 tons of joints to Owen Joist Co.; 67 tons of fabricated structural steel to Groisser & Shlager Iron Works, Somerville, Mass., and the balance reinforcing bars to U. S. Steel Supply Div., U. S. Steel Corp., Boston; Granger Contracting Co., Worcester, Mass., general contractor.

120 tons, intermediate school, South Hadley, Mass., to Haarmann Steel Co., Holyoke, Mass.; M. J. Walsh & Son Inc., Holyoke, general contractor.

115 tons, treatment plant, Anchorage, Alaska, to United Iron Works, Seattle; Alcan-Pacific Co., Anchorage, general contractor.

115 tons, Oregon State overcrossing, Baker County; American Bridge Div., U. S. Steel Corp., Pittsburgh, reported low bidder on subcontract.

113 tons, Morse Bridge, state project No. 5694, Bangor, Maine, to Bancroft & Martin Rolling Mills Co., South Portland, Maine; H. B. Fleming Co., South Portland, general contractor.

110 tons, including reinforcing bars, junior-senior high school, Granvy, Mass., to Groisser & Shlager Iron Works, Somerville, Mass. (structurals), and Scherer Steel Co., East Hartford, Conn., (reinforcing bars); E. J. Pinney Co. Inc., Springfield, Mass., is general contractor.

STRUCTURAL STEEL PENDING

2100 tons, state bridgework, Route 95, Section 1-G, Bergen County, New Jersey, G. M. Brewster, Bogota, N. J., low on the general contract.

770 tons, Chugach Electric Association, overland route transmission line, Alaska; Gustav Hirsch, Anchorage, sole bidder on Schedule B, $1,408,407; Schedule A, aerial crossing of Turnagain Arm, using heavy cable, Nat Harrison Associates Inc., Miami, Fla., J. A. Troxell and White Bros., Seattle, joint low at $2,122,846.

750 tons, four Oregon State bridges; bids in.

550 tons, thermal power station, West Pakistan; Kuljian Corp., Philadelphia, closes bids Dec. 21.

385 tons, Seventh Street bridge, Southwest Freeway, Washington; bids Dec. 20, Department of Highways, District of Columbia Commission; also, 230 tons of concrete reinforcing bars.

200 tons, Boeing Airplane Co., Seattle, plant addition; Austin Co., Seattle, general contractor.

135 tons, conversion of Copper River bridge, Alaska; new bids to Juneau, Alaska, Dec. 29.

115 tons, Anchorage, Alaska, water treatment plant; general contract to Alcan Pacific Co., Anchorage, low at $1,575,500.

169 tons, state bridgework, Elk-Jefferson counties, Pennsylvania, bids Dec. 29.

REINFORCING BARS . . .

REINFORCING BARS PLACED

3500 tons, Washington State Latah Creek bridges (two), Spokane County, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Puget Sound Bridge & Dry Dock Co., Seattle, general contractor.

1200 tons, Port of Kalama, Wash., grain elevator, to Mercer Steel Co., Portland, Oreg.; Max J. Kuney Co., Portland, general contractor.

200 tons, dormitory, Wellesley College, Wellesley, Mass., to Bethlehem Steel Co., Beth-

This 2-KW **Sonogen**® ultrasonic-cleaning installation was designed in collaboration with the Lycoming Division of Avco to handle the toughest jobs in the shop. Planned originally for close-tolerance gas-turbine parts whose complex geometry and heavy scale handicapped old-fashioned cleaning methods, it now works three shifts on air diffusers (photo) and other difficult parts pre-selected for efficient **Sonogen**® cleaning. Repeated cycling in conventional cleaning baths failed to remove all scale, oxide and soil; now the fast, efficient scrubbing action of **Sonogen**® cleans every surface thoroughly without re-cycling / Your problem may be different from Lycoming's, but the solution is probably the same — a **Sonogen**® ultrasonic-cleaning system engineered for your needs. Write today, giving us full details.

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ULTRASONIC CORPORATION

36 BROWN HOUSE ROAD, STAMFORD, CONN.

lehem, Pa.; Wexler Construction Co. Inc., Newton Highlands, Mass., general contractor.

200 tons, Idaho State, Clearwater highway bridge, to Union Iron Works, Spokane, Wash.; Cahoon Construction Co., general contractor.

135 tons, intermediate school, South Hadley, Mass., to Truscon Steel Div., Republic Steel Corp., Boston; M. J. Walsh & Son Inc., Holyoke, Mass., general contractor.

118 tons, commercial building, Denver Public Service Co., Denver, to Colorado Builders' Supply Co., Denver; Mead & Mount Construction Co., Denver, general contractor.

REINFORCING BARS PENDING

1440 tons, Seattle City Hall and municipal garage, previously reported 800 tons; general contract to Patti-MacDonald Construction Co. and Milbur Inc., Seattle, joint low at $4,856,878.

170 tons, 617 ft concrete bridge, Douglas County, Oregon; general contract to Workman Construction Co., Canby, Oreg., low at $160,430, to the Bureau of Public Roads, Portland, Oreg.

100 tons, power transmission line, Chugach Electric Association, Anchorage, Alaska; alternative bids in.

100 tons or more, Oregon State undercrossing, Douglas County; Sig Anderson, Coos Bay, general contractor, low at $89,716.

100 tons, including 70 tons of reinforcing; conversion of Copper River bridge, Alaska; bids rejected; new bids asked Dec. 29, Department of Public Works, Juneau, Alaska.

PLATES . . .

PLATES PLACED

884 tons, hull plates, Navy General Stores Supply Office, Philadelphia, to Caine Steel Co., Chicago; also, 72 tons to the U. S. Steel Corp., Pittsburgh.

245 tons, water tank, Alderwood Manor, Wash., to Chicago Bridge & Iron Co., Seattle; general award at $84,952.

126 tons, alloy, Navy General Stores Supply Office, Philadelphia, to Kaiser Steel Corp., New York; 65 tons of stainless to Eastern Stainless Steel Corp., Baltimore.

100 tons, jet fuel storage, AFB, Columbus, Miss., to Chicago Bridge & Iron Co., Chicago.

PLATES PENDING

1000 tons, five oil tanks, 300,000 barrel capacity, for Port of Vancouver, Wash., tank farm; Carroll Co. Inc., Portland Oreg., low at $633,589.

334 tons, Grade M, hull plates, Navy General Stores Supply Office, Philadelphia; bids Dec. 27.

245 tons, 2.4 million gallon watertank; Chicago Bridge & Iron Co., Seattle, is low at $84,952 to Alderwood Manor, Wash.

PIPE . . .

CAST IRON PIPE PENDING

Unstated tonnage, 34,000 ft of various sizes; bids to Longview, Wash., Dec. 22.

RAILS, CARS . . .

RAILROAD CARS PLACED

Great Lakes Steel Corp., 30, seventy ton gondolas, to Thrall Car Mfg. Co., Chicago Heights, Ill.

Illinois Central, 731, seventy ton hoppercars and 750, double door boxcars, to own shops at Centralia, Ill., as part of its 1961 program; orders will be placed with commercial shops for 100, seventy ton, covered hoppercars and 25, air-slide cars.

Chicago Transit Authority, 300 diesel buses costing $7,884,273 to: 150 Fixible Twin Coach Co., Loudonville, Ohio, 150, General Motors Corp., Detroit.

New York City Transit Authority, 60 subway cars to St. Louis Car Co., St. Louis.

Western Fruit Express, 10, forty ft, aluminum, mechanically refrigerated semitrailers, to Brown Trailer Div., Clark Equipment Co. Buchanan, Mich.

RAILROAD CARS PENDING

Rio Grande, 150, seventy ton hoppercars, contemplated.

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You May Win $1000 By Reading This Issue of STEEL

See Page 6 Servicenter For Details

STEEL's Big Usership-Idea of-the-Month Contest

No Boxtops No Jingles

Just tell us how you use articles or advertisements that you see in STEEL

"We found that many of our employees have been using the Payroll Savings Plan for twenty years!"

"Frankly, I was surprised to find out that the Payroll Savings Plan has been in operation for two decades. Even more surprising was the fact that so many of our people have been using the Plan to buy U. S. Savings Bonds every single month since the Plan was first put in. Some of our veterans told me they have used these savings to help buy homes, put youngsters through college, and to build up their reserve for retirement. Because it benefits the country and the community as well as themselves, we feel more of our people should take advantage of the Payroll Savings Plan. That's why we conduct a new canvass each year to remind them of its benefits. In addition, we call it to the attention of all new employees at the time they come to work."

Perhaps your own company staff has been increased substantially since your last Payroll Savings Campaign. If you will contact your State Savings Bonds Director, he'll be glad to set up a thorough canvass of your company family, and see that every employee gets a friendly explanation of the Plan, and how it makes regular saving so easy it is actually automatic.

ALL U.S. SAVINGS BONDS—OLD OR NEW—EARN ½% MORE THAN BEFORE

STEEL
The Metalworking Weekly

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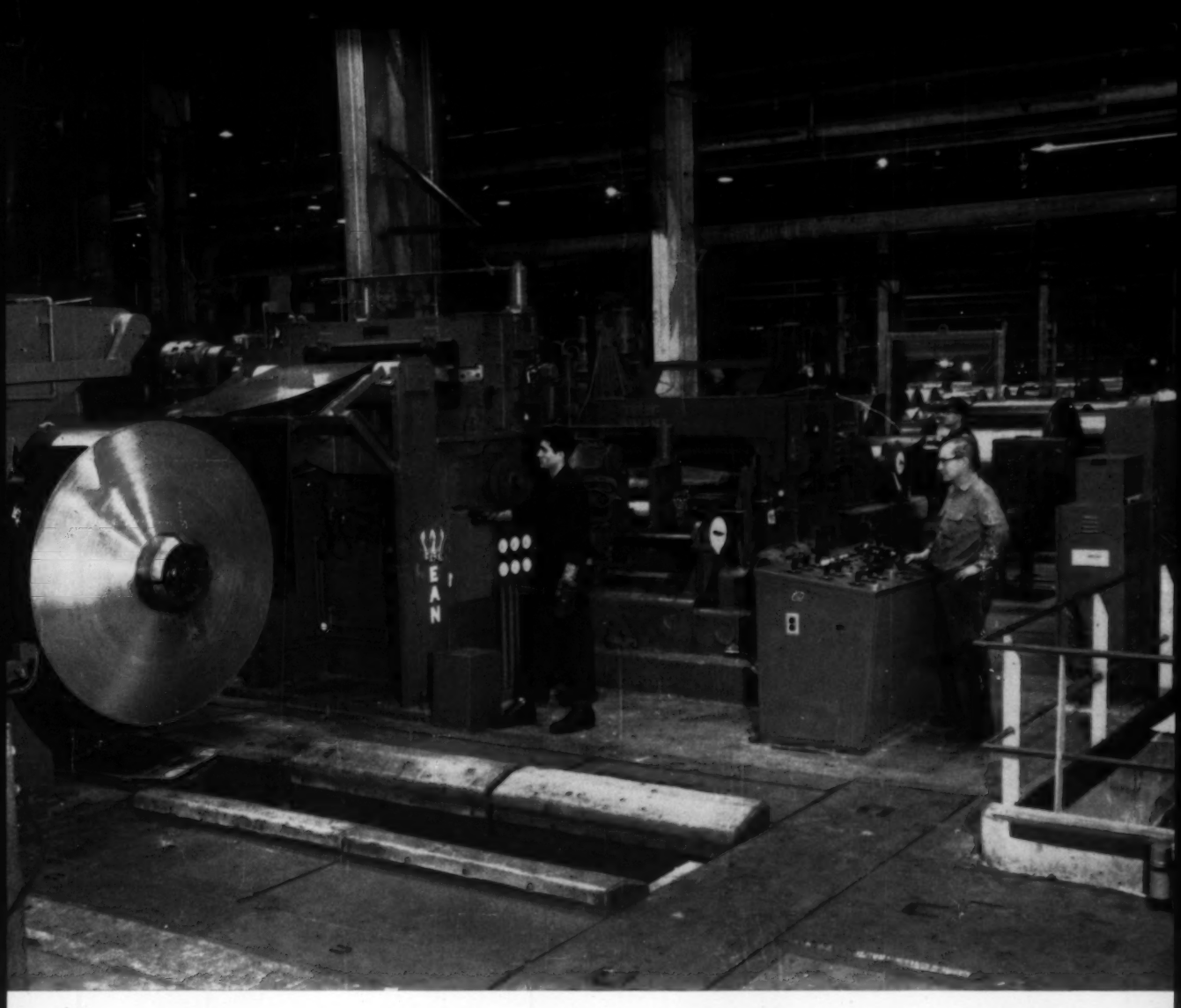

Weirton Steel installs Wean Trimming Line for more efficient tinplate operation

Weirton Steel Company Division of National Steel Corporation recently installed this new Wean side trimming line to increase efficiency in its tinning operations. After the plate has been tempered to customer specifications, it is moved to the Wean tension-type line for final trimming. This advance preparation of coils provides larger, evenly wound coils for the electrolytic tinning line.

The Wean side trimming line has a maximum speed of 4,000 feet per minute and is able to handle 60,000 pound coils 18 to 45 inches wide. Inside diameter of the coils is 16½ inches; maximum outside diameter is 85 inches. Many new design features are incorporated to side-trim coil to accurate widths at high speed.

To improve the efficiency of your tinplate production, call upon a Wean representative to help you plan your requirements. Wean's "creative engineering" has played a vital role in the development of over 75% of the continuous tinplate processing lines in operation today.

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO

When you buy Timken® bearings you are investing in a better bearing value for today and in the future

HAVE you had occasion to compare the sizes of Timken® tapered roller bearings used in modern automobiles and trucks with those used 10 or 25 years ago?

Today's cars and trucks are a lot more powerful, a lot heavier and a lot more dependable, yet the bearings are smaller and more economical. That's possible because the Timken Company has found ways to pack more capacity into less space . . . by developing better bearing steels, better design proportions, new ways to produce precision geometry and by investing in long term fatigue research.

Underlying developments of this kind is the philosophy of the Timken Company—*Service.* Not just institutional service to industry, but service on an individual basis. The on-the-spot bearing service that only a thoroughly trained Timken Company engineer can give.

Timken Company salesmen are graduate engineers—able and eager to give on-the-spot professional assistance to help you build the most serviceable, the most reliable, the most saleable machines.

This dynamic partnership with industry has enabled the Timken Company to become the world's largest manufacturer of tapered roller bearings with an enviable reputation for product excellence, pioneering of new applications and bearing industry leadership. It explains in part why Timken bearings are preferred by your engineers.

An important share of every Timken bearing sales dollar is plowed back into better research, testing and production facilities. This impatience with just "good enough" is why practically every major tapered roller bearing development has come from The Timken Roller Bearing Company. Invest more of your bearing dollars with the leader—it will repay you in better products that cost less.

The Timken Roller Bearing Company • Canton 6, Ohio